JUN 30 1925


# The ELECTRICAL REVIEW

FOUNDED 1872

VOL. XCVI. No. 2481. [All Rights Reserved.] JUNE 12, 1925 [Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage.] PRICE SIXPENCE.



**LITHOLITE INSULATORS, Ltd.**
55—57, Hackney Grove, London, E. 8.
'Phone and Telegrams: Dalston, 592, London.
FIREPROOF AND OTHER GRADES.
ESTABLISHED OVER 20 YEARS.

The Acme Production Co., Ltd., Electrical Specialities Manufacturers.
**Automatic Flashers**
London Offices and Showroom: 102, Gt Russell St., London, W.C.1.
Britannia Works, Rolfe St. and Engine St., SMETHWICK, BIRMINGHAM.

**WRIGHT** Tel. Motor
A.C. and D.C. **MOTORS.**
WRIGHT MOTORS, Ltd., HALIFAX.

**RESISTANCE MATERIALS**
Asbestos Woven Resistance Grids. Resistance Cord. Resistance Wires & Tapes.
CRESSALL MANUFACTURING CO.,
Staniforth Street, BIRMINGHAM.
Telegrams: "Ohmic, Birmingham." Telephone: Central 2463.

LANTERN REFLECTOR, WATERTIGHT AND SHIPS' FITTINGS,
**E.L.E.C., LTD.**
with Anti-Vibrator Discs.
ENGINEERING & LIGHTING EQUIPMENT CO., LTD.,
Sphere Works, St. Albans, Herts.

**SURGE ARRESTERS AND—**
See next announcement.
ISENTHAL & CO., LTD.,
Denzil Works, Willesden, N.W. 10.

**SWITCHGEAR.**
ERNEST F. MOY, LTD.,
Manufacturing Electrical Engineers and Government Contractors,
GREENLAND PLACE, CAMDEN TOWN, LONDON.

TAYLOR & PETTERS, Ltd.,
40, Hatton Garden, E.C.1.
'Phone: Holborn 2961
**Mica & Micanite**
MICA PLATES for MAGNETOS and WIRELESS CONDENSERS. HIGH-TENSION RINGS. for X-RAY ELECTRICAL INSTRUMENTS. DIAPHRAGMS for SOUND BOXES and LOUD SPEAKERS. COMMUTATOR Segments. V-RINGS, Washers, Tubes, &c.

**JULIUS SAX**
Specialists in
Est. **BELLS** 1855.
and
**Wall Plugs.**
24a, High Street, Bloomsbury, W.C.2.

**CHURTON**
SINGLE and POLYPHASE
**MOTORS.**
T. HARDING CHURTON & CO., LTD.,
Atlas Works, Water Lane, LEEDS.

**300** MOTORS IN STOCK. FOR SALE OR HIRE.
**D.C. REWINDS A.C.**
**B.E.C.** BRITISH ELECTRIC CO.,
Hop 5749. Est. 1883.
ROTHERHITHE, LONDON, S.E. 16.

**"EMPIRE"**
"S. & C." HIGH TENSION FUSES
UP TO 132,000 V.
are guaranteed to extinguish the arc and clear any short in the first half cycle.
ELECTRIC CONTROL LTD.,
EMPIRE WORKS, GLASGOW.
Birmingham, Leeds, London, Manchester, Swansea, Australia, New Zealand, South Africa and Shanghai.

**PORCELAIN**
BAKELIZED BOARD, PAPER & TUBE.
HARWELL, LTD.,
28, John St., Theobald's Rd., London, W.C. 1.
'Phones: Museum 5422 and 5423. Telegraphic Address: 'Arwelidite, Holb. London.'

**WESTERN-ELECTRIC**
COMPANY, LIMITED,
Connaught House, Aldwych, W.C. 2.
Works. NORTH WOOLWICH, LONDON, E.
TELEPHONES & CABLES.
Electrical Household Domestic Appliances.
See Advertisement this week, page xxxix.

**Cutting**
Electric Motors.
CUTTING BROS., LTD., STAMFORD.
*Telegrams: Cutting, Stamford. Tel. No. 15.*

**WHITE**
Electrical Instrument Co., Ltd.
*2, 4 & 6, GLOUCESTER ST., CLERKENWELL, LONDON, E.C. 1.*
Wire. Voltograph, London. 'Phone: Clerkenwell 6899.

**"SISTOFLEX" Regd.**
INSULATING MATERIALS and WIRELESS COMPONENTS EBONITE
SPICERS, Limited (Insulation Dept) 19, New Bridge St., London, E.C. 4.
'Grams: Nyktopina, Lud, London 'Phone: City 6251, Ex. 41.
*See our Advt. on Sup. 41 of this issue.*

**INSULATING -- BEADS --**
*Immediate Delivery.*
HOLDER-HARRIDEN LTD., 1-2, Chiswell St. London, E.C.

**Underground— Overground.**
*See Sup. 10 and 11.*

**DERMATINE**
**DERMATINE**
**DERMATINE**
**DERMATINE**
THE SOLENOID REGULATOR CO.,
Makers of A.C. & D.C. Control Gear,
**268, MOSELEY ROAD, BIRMINGHAM.**
*Telephone: Midland 532.* *Telegrams: "Solenoid, Birmingham.*

**RATIOS**
that determine
**VALUE.**
P.T.O. *The British Aluminium Co., Ltd., 109, Queen Victoria St., London.*

**MAVOR & COULSON, Ltd.,**
GLASGOW.
**MOTORS, DYNAMOS. SWITCHGEAR.**

**CONVEYORS & ELEVATORS.**
Power Station, Coal & Ash Handling Plants.
FRASER & CHALMERS ENGINEERING WORKS,
(*Proprietors*: The General Electric Co., Ltd.)
ERITH, KENT. *London Office:* Magnet House, Kingsway, W.C. 2
Associated with Robins Conveying Belt Co., of U.S.A.

**CARSON'S**
27, UPPER THAMES ST., E.C. 4.
Grams: "Irishism Cent. London. 'Phone: Central 0667.
**INSULATORS.**

**FULLER'S** UNITED ELECTRIC WORKS, LIMITED.
MANUFACTURERS OF
ACCUMULATORS BATTERIES
WIRES & CABLES EBONITE
WIRELESS APPARATUS CARBON BLACK
*Head Office:*
(*General Sales Offices and Works*).
WOODLAND WORKS, GROVE ROAD,
CHADWELL HEATH, ESSEX.

REGD. TRADE MARK.
GEAR OF **BOTRADE** DISTINCTION.
Troubleless Switches and Dis-Boards.
*WRITE FOR 1925 CATALOGUE.*
S. BILL & CO., LTD., Queen's Rd., Aston, B'ham.
'Phone: EAST 671-672. 'Grams: AICHO, B'HAM.


*Advertisement Index, see page lvi.* *Official Notices, see Sup. 34.*

E.R. 12/6/25.

# RATIOS
# that determine VALUE

**For Conductors, a**
**Low Cost/Conductance Ratio.**

ON this basis, Copper scores over Silver, but Aluminium over both. Hence ALUMINIUM BUSBARS and other large-sized conductors.

**For Moving Parts, a**
**Low Weight/Strength Ratio.**

LARGE Inertia means large actuating forces and slow speed. ALUMINIUM provides the requisite strength with small inertia. Hence its use for MOVING PARTS of OIL SWITCHES, etc.

**For General Castings, a**
**Low Cost/Rigidity Ratio.**

RIGIDITY is not necessarily a function of tensile strength, and without loss of rigidity, Aluminium can replace stronger metals with economy, *e.g.*, in BASEPLATES, COVERS, Etc.,

**Aluminium**

**is Non-Magnetic and an Excellent Heat-Conductor also.**

***Write for Data appropriate to YOUR Problem.***

**THE BRITISH ALUMINIUM CO., LTD.,**
**109, Queen Victoria Street, London, E.C. 4.**

Telegrams: "CRYOLITE, CENT." Telephone: CITY 2676.

**Mica** Insulators for every description **Micanite** of Electrical Work.

Superfine "MICAYLOR" Diaphragms for Sound Boxes

Taylor & Petters, Ltd. 40, Halton Gardens, London, E.C.1. Phone: Holborn 2361. Telegr: Micaylor, London

We supply 1 Million Condenser Plates Weekly to the Magneto & Wireless Trades.

We specialise in Cutting Castings Machining

**THE ELECTRICAL POWER ENGINEERING CO. (B'HAM), LTD.**

*Established 1900.* **Works & Head Office: STECHFORD, BIRMINGHAM.**

***D.C. MOTORS & GENERATORS.***

**Accurate Design.**
**Mechanical Perfection.**
**Ball and Roller Bearings.**
**Low Temperature Rise and High Efficiency.**
**Fully Guaranteed.**
**23 Years' Experience.**

STANDARD E V. MOTOR.

WRITE FOR NEW LIST No. 276. SPECIAL TERMS TO THE TRADE.

LONDON OFFICE.
J. S. PLUMTREE, A.M.I.E.E.,
90-91, High Holborn, W.C.1.
'Phone: Chancery 8121.

AUSTRALIA.
WARMAN & DOUGLAS,
Flinders Lane.
MELBOURNE.

*SEND IT TO—*

**REPAIRS WINDS DESIGNS COLLINS ELEC. LTD.,**

115, CLERKENWELL ROAD, LONDON, E.C. 1. TEL: HOLBORN 212.

The

# Electrical Review

VOL. XCVI. JUNE 12, 1925. No. 2,481.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

*Chairman:* H. ALABASTER.

*Technical Editor:* A. H. ALLEN, M.I.E.E. *Joint Managing Directors:* G. H. ALABASTER. E. A. GATEHOUSE, M.I.E.E. A.M.INST.C.E. *Commercial Editor:* A. H. BRIDGE.

*Manager and Secretary:* E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT., LONDON," Code, A B C. Telephone Nos.: Central 8260 and 8261.

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s 6d.; Canada, £1 12s. 6d.; Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

LIST OF FOREIGN AGENTS (see first page "Official Notices").

## Contents:

| | PAGE |
|---|---|
| The Legislature and Electricity Supply | 921 |
| A B.B.C. Sentinel Station | 922 |
| The Insurance of Generating Plant | 922 |
| The Trend of Physics | 922 |
| Electrification of French Collieries | 923 |
| Electrical Engineering in Ireland | 923 |
| Electrical Conventions | 923 |
| The British Empire Exhibition (*illus.*) | 924 |
| Electricity in Agriculture, by H. Ambrose Carney (*illus.*) | 926 |
| The Design of Cooling Fans, by W. G. White | 928 |
| The Advantages of Electric Cooking | 929 |
| Charging Storage Cells in Celluloid Cases | 529 |
| Reviews | 930 |
| Business Notes | 931 |
| Lighting and Power Notes | 934 |
| Tramway and Railway Notes | 935 |
| Telegraph and Telephone Notes | 936 |
| Radio Notes | 936 |
| Contracts Open and Closed | 936 |
| Forthcoming Events | 938 |
| Notes | 938 |
| The Institution of Electrical Engineers (*illus.*) | 939 |
| The Incorporated Municipal Electrical Association (*illus.*) | 941 |
| Institution Notes | 946 |
| Our Personal Column | 946 |
| New Companies Registered | 947 |
| Official Returns of Electrical Companies | 948 |
| City Notes | 948 |
| Stocks and Shares | 949 |
| Market Quotations for Chemicals and Metals | 950 |
| The Pensions Bill, by Jos. J. H. Stansfield | 951 |
| The Training of Power Supply Engineers, by F. G. Bromley | 952 |
| Ceylon's Electrical Imports | 953 |
| Italy's Electrical Trade | 953 |
| French Electrical Progress | 954 |
| Russian Notes | 954 |
| Trolley 'Buses for Shanghai (*illus.*) | 955 |
| The Insulation of Enamelled Wire (*illus.*) | 956 |
| New Electrical Devices, Fittings, and Plant (*illus.*) | 957 |
| Correspondence— | |
| The Electricity Supply Problem | 958 |
| Trade with Brazil | 958 |
| Fires Caused by the Charging of Accumulators | 959 |
| Technical Journals for Boys | 959 |
| The Engineering Profession and Industry in Ireland | 959 |
| Published Specifications | 960 |
| Contractors' Column | Advertisement page xxxvi |

# The Legislature and Electricity Supply.

ALTHOUGH the Electricity Commission was established by Act of Parliament, for purposes that were fully defined, it does not follow that the Commissioners have a free hand to carry on their work without interference. In the first place, they are responsible to the Minister of Transport; and before his approval of an administrative act can be obtained, in all cases which meet with substantial opposition, a public inquiry has to be held. The resulting Special Order must be laid before each House of Parliament for 30 days before it can acquire the force of law, and either House can block the Order. In some cases the Special Order cannot come into operation until it has been approved by a resolution of each House.

That this is no mere form was demonstrated by the publication last week of the report of a Select Committee of the House of Lords on legislation by Special Orders, in which it was recommended that a Standing Committee should be appointed to consider Special Orders (which are provided for by various Acts of Parliament) which required confirmation by resolution, and should determine whether a further inquiry should be held before the House proceeded to deal with the resolution. Petitions were to be received, and the private rights affected were to be considered, as well as important questions of policy, principle, and precedent. We are not aware that, up to the present, any Special Order made by the Electricity Commissioners and submitted to Parliament by the Minister of Transport has been negatived by either House, but the possibility is always present, and Parliament is by no means handing over its executive powers to the Ministry without retaining the right to the last word.

As a case in point, though of a somewhat different nature, we may cite the interesting situation which has arisen in connection with the supply of electricity in the West Riding (Aire and Calder) Electricity District. The Yorkshire Electric Power Company has been endeavouring during the past twelve months to carry into effect, in conjunction with the principal municipal authorities, a scheme for the supply of electricity in the district which had the approval of the Electricity Commissioners; the directors, however, as reported in our last issue, have found that the scheme cannot be put in force, and have decided to proceed with the development of electricity supply under their own statutory powers, which, they maintain, are adequate for the purpose of providing a "cheap and abundant supply" of electricity in their area. The company claims that already satisfactory progress has been made towards concentrating the generation of electricity in large and efficient stations, and that the few small stations that remain will in due course be superseded, whilst an extensive network of mains has been installed, and the

development of the domestic load is "proceeding at an unprecedented rate," thousands of cottages having been connected to the mains during the past year.

The difficulty which has brought about this situation arose out of the refusal of Parliament to accept a Bill which the company, by agreement with the principal authorities and with the strong approval of the Electricity Commissioners, promoted last year, and which contained provisions that were essential to the execution of the scheme drawn up in February, 1924. There seems to be no escape from the politicians, who in a few days wreck the work of months. In this case, by agreement, the Power Company was surrendering its rights in one area and receiving extended rights in another, and Sir John Snell testified to the urgency of the matter; but a Select Committee of the House of Lords listened to the opposition of municipalities outside the district concerned and incontinently rejected the Bill.

There are not wanting those who maintain that the power companies, with the statutory powers conferred upon them by their Acts, are quite capable of carrying out the functions of the proposed Joint Electricity Authorities, and in point of fact the only Joint Electricity Authority that has actually come into effective operation—the North Wales and South Cheshire Joint Electricity Authority—has delegated the technical scheme *en bloc* to the North Wales Power Company. But, while the companies possess the powers, they are to a certain extent controlled by the Electricity Commissioners; and when the latter, appointed by Parliamentary authority, in the exercise of their duties and with the support of the local authorities mainly concerned appeal to Parliament to sanction a Bill promoted at their wish but at the company's expense, Parliament promptly vetoes the scheme and delays progress for another twelve months!

However, that is past history; the company has endeavoured, by virtue of a Special Order of the Electricity Commissioners, together with agreements with the municipalities, to put in force the provisions of the rejected Bill, but has been advised by counsel that the arrangement is not legally valid. Hence it has now determined to go ahead and make up for lost time, but it should be placed on record that everything possible was done to meet the wishes of the Electricity Commissioners, without avail, and only Parliament can untie the knot that it has woven.

---

**A B.B.C. Sentinel Station.**

The new station which the B.B.C. has erected at Bromley, Kent, ought to prove very useful in respect of two of its proposed functions. First, it is to act as an interceptor of Continental and American transmissions which it may be desired to relay to 2 LO for re-broadcasting. Second, it is to act as a "detective" station which will, by means of carefully calibrated instruments, keep an accurate check upon the wavelengths of the various B.B.C. stations.

With respect to the third purpose for which it is proposed to be used, however—the tracing of "howlers"—there is room for doubt as to whether it will prove an effective means of diminishing this nuisance unaided. When it is considered how thickly aerials are clustered together now in extensive city areas, frequently separated as they are by only a few feet, it becomes obvious that the apparatus which will enable an operator in a distant station to localise the offending aerial with accuracy will have to be amazingly efficient, far more so in fact than anything we have at present. Probably the most effective direction-finding apparatus yet devised is that recently brought out by M. de Bozas, an official of the French Ministry of Posts and Telegraphs, a radiogoniometer which, it is said, the French authorities are now using to track down unauthorised transmitters.

But even such an instrument as this would have an extremely restricted usefulness if used in a fixed station. A reasonable degree of success would probably be achieved by the B.B.C. if it were to equip a number of motor-cars with sensitive direction-finding apparatus which, operating in the confined area of a single street, would soon localise the offending aerial. The Bromley station might conceivably be used as a kind of general headquarters for these cars, transmitting to them instructions as to the approximate vicinity from which the interference was proceeding, so that a car could go there without delay to track down the offender. A brief campaign like this would probably soon lead to quieter conditions in the ether.

---

**The Insurance of Generating Plant.**

We are afraid that the reports which recently obtained circulation stating that in certain arbitration proceedings it had been held that an insurance company was not liable to pay damage or loss under its policies when such damage or loss occurred during the "period of grace" allowed for the payment of renewal fees, must have occasioned perturbation in many minds. The publication of the fuller details, however, served to allay special anxiety. The period of grace may be, and no doubt is, taken advantage of in some cases by the class of people who never dream of paying their rates or taxes until they have received two or three applications of progressive colouring, but after all, what is the utility of a period of grace to the insured unless the risks are still covered? It seems that a good deal depends upon his future intentions. Speaking broadly, we think it is fairly generally recognised that the concession is granted on the reasonable anticipation that the business is to continue, and that the fee will be paid at the earliest convenient moment within the period. Yet the insured has come to feel that if he should have to let the matter drop or for any reason must change offices, he is entitled to enjoy a feeling of security during the period of grace. If the insured has given evidence that he may not be renewing his policy it seems that he is less entitled to claim concessions, but this question then naturally arises: Is he to be required to notify during the period that he has a reasonable intention to continue? The case which forms the basis of the present comment was essentially a business matter handled by business men, but a correspondent suggests that ordinary people ignorant of business matters do not dream at present that there is any necessity for them to inform a company that they do intend to pay, and that they wish to be covered against any contingency during the period of grace. It is thought that insurance companies should be invited to make a specific note on their renewal notices with regard to the days of grace as affected by such points as were raised in the recent case, so that the insured may be in no doubt whatever concerning his position.

---

**The Trend of Physics.**

An address given recently by Prof. W. F. G. Swann, of Yale University, on "The Trend of Thought in Physics," offers several points of interest which deserve attention from those who exercise their minds from time to time on the question: "Where are we going?" Now, the trend of modern physics is unmistakable, it needs but one line to describe it: the trend of modern physics is towards metaphysics. This is somewhat deprecated, but at the same time amply exemplified in this address. For instance: "In its fundamental aspects, practically the whole of modern physics is concerned with the discussion of the relations which exist between the motions of two sets of points in such a way as to establish a sort of one-one correspondence between the things which we do, and the behaviour of one set of points on the one hand, and the things which we observe and the behaviour of the other set of points on the other hand."

Again: "A power of critical insight which will enable us to show that, in the last analysis, nothing is real and most things are meaningless, is all very well in its way; but it will not always carry its owner very far, and may frequently lead him into pessimism."

We witness the triumph of the relativity theory, the activities of which, at present, occupy the whole field of physics. Yet Prof. Soveri, in an article to be found

in the February issue of *Scientia*, strikes a note of dissent. Dealing with Einstein's relativity of time, *viz.*, "two flashes produced at equal distances from me are simultaneous if I perceive them at the same instant," he objects: the definition depends on a concept of simultaneity; that concept is spontaneous and intuitive; the very concept the definition is intended to supersede.

The liberal-minded may be unperturbed to note that physics is heading straight for metaphysics on the ground that all branches of science lead one into another; but alas! to this rule metaphysics is exceptional in that so far it has led nowhere, for to follow the metaphor, it has, like the trunk of a tree leading to the roots, buried itself in darkness underground.

Prof. Swann, from his concluding remarks, is evidently of the opinion that we should confine ourselves to seeking the laws which govern the behaviour of phenomena and not be too particular as to whether such laws can be expressed so as to be consistent one with another. In his own words: "Perhaps the most hopeful condition is a combination of critical insight with a none too delicate conscience when smelling out the truth."

---

**Electrification of French Collieries.**

In connection with the restoration of the French collieries in the Nord and the Pas de Calais which were devastated during the course of the war, great development has taken place in the use of electricity as compared with 1914; the work of generation has to a large extent been centralised. The coal basins in question possessed electrical plant of only 105,000 kW in 1914, whereas the station capacity of these particular mines is now 260,000 kW. The capacity of the Thiers power station is 20,000 kW; that of the Aniche company is 30,000 kW at present, and it is to be increased to 50,000 kW; while that of Dourges is 33,750 kW. In addition to the erection of these comparatively large works, the owners have embarked on the use of pulverised coal as fuel, thus releasing the better sorts for general consumption. The extension of the generating plant has permitted not only the modernisation of the equipment, the driving of winding engines and other plant, pumping operations, &c., but it has also rendered possible a better ventilation of the mines and an increase in the compressed air available.

---

**Electrical Engineering in Ireland.**

The situation of professional engineers in Ireland, as described by a correspondent in this issue, appears to be anything but a happy one, and according to his statement the engineering Institutions regard it as beyond the scope of their activities. A certain amount of dislocation of the normal *régime* may reasonably be expected to occur during periods when the State organisation is in transition from one form to another, but no time should be lost, when settled conditions are restored, before the long established observances of civilised communities are set in order again. On this side of the water there has been a marked tendency on the part of the great Institutions during recent years to interest themselves actively in the welfare of their members, and to do everything possible to raise their status—a movement which has undoubtedly done much to strengthen their position and has received the cordial approval of the membership. Assuming that the facts are accurately stated by our correspondent, the apathy of the professional bodies in Ireland is very much to be regretted—all the more in the light of the helpful attitude with which the Government of the Free State is credited.

As Mr. White points out, the decision of that Government to go ahead with the Shannon development scheme greatly increases the gravity of the situation; as the State provides the funds, the work will undoubtedly proceed, and its progress will be closely watched by the British Empire public and by the engineering world in general. It is therefore very important, from the technical point of view, that the work shall be entrusted only to competent hands—for any failure is sure to reflect upon the prestige of British engineering, whether the scheme be German or British. Moreover, there is a commercial side to the question; the State will do all that it can to promote a greatly increased demand for electrical energy, and consequently for electrical apparatus and materials, on which many millions will be spent during the next few years. The destination of a large part of that outlay will be controlled by the technical advisers of the purchasers, and as our correspondent suggests, the matter is too important to be allowed to drift. Whatever the difficulties that may be encountered in coping with the threatened competition—difficulties due to political manœuvres, to the strategical advantage acquired by the Germans as contractors, to price-cutting, or to incompetent advice—this useful market certainly ought not to be surrendered by British manufacturers without a fight. We therefore commend to their attention the meeting which is being organised, to be held in Dublin, to deal with the question of engineering status and qualifications in Ireland; there is nothing to be lost by supporting this movement, and on the other hand, there is much to be gained if it is carried to a successful issue.

---

**Electrical Conventions.**

Writing at a moment when the Summer Meeting of the Institution of Electrical Engineers is in progress, and the Annual Convention of the Incorporated Municipal Electrical Association in prospect, we are thankful to observe the brilliant sunshine which has at last returned to this land of many climates, and which bids fair to continue for a week or two. This, the most necessary condition to ensure the success of such functions, is not yet subject to human control; and if it were, in all probability its management would lead to violent differences of opinion and possibly to the rending of the social fabric, for there are vested interests in weather as in all other factors of our environment. Hence we shall do well to make the most of the fine weather, submitting with resignation to the less genial phases with which we are so often visited.

In this respect the Institution is fortunate in that its members, who have worked through a whole session of professional discussions, are now purely on holiday; part of the time, it is true, resembles the traditional 'busman's holiday, involving visits to works of electrical interest, which will enable the ladies to realise the strenuous nature of the duties and the stupendous responsibilities of their male companions—but music and dancing, and the inspection of works of art and the beauties of Nature occupy a large space in a programme which appears to be particularly enticing. Much credit is due to the South-Midland Centre, and to the local authorities and electrical companies for the admirable arrangements that they have made for the meeting, which concludes to-day with a "gala night" at Birmingham.

The I.M.E.A., on the other hand—apart from the labours of its industrious Council and officers—has to combine business with pleasure as an essential factor of its proceedings; this is not a matter for regret, as the Convention affords an invaluable opportunity for confabulation, both public and private, and undoubtedly reacts to the public benefit by stimulating thought and promoting the adoption of up-to-date ideas. For the first time a "Special Meeting for Women" is to be held, to be devoted to a discussion on the application of electricity to domestic problems—with tea to follow; we note with regret that tickets of admission will be required, which we have not received from the secretary. In this meeting the Electrical Association for Women will take part. Whilst all the three papers, as well as Mr. W. C. P. Tapper's presidential address, are sure to prove interesting, we look forward with especial anticipatory pleasure to that of Mr. L. L. Robinson, which we imagine will provoke a lively discussion, in view of the author's well-known and uncompromising attitude towards the wiring question. This paper will be read appropriately in the Music Room of the Royal Pavilion.

Altogether the prospects for the holding of a very successful and exceptionally enjoyable Convention appear to be very favourable.

D

# The British Empire Exhibition.

## Some Engineering Features of the Exhibition of 1925.

### Rearrangement of Electric Power Supply.

THE 1925 edition of the British Empire Exhibition at Wembley has been organised on somewhat different lines from those of last year. The aim has been to appeal more to popular taste, and an effort has been made to emphasise the value of the various British possessions with the aid of more attractive displays and interesting exhibits. Whilst the show has been improved in many ways, its engineering features have dwindled sadly; the wonderful Palace of Engineering is no more, and the a.c. and d.c. plant which, aided by the North Metropolitan Electric Power Supply Co.'s supply, met the electrical requirements of the exhibition in 1924, has been dismantled. Consequently new arrangements had to be made for supplying the electricity needed for power and lighting purposes this year, and a contract has been entered into with the North Metropolitan Electric Power Supply Co. to furnish the whole of it. In this connection credit is due to Sir James Devonshire, K.B.E., M.I.E.E., chairman and managing director, and to Capt. J. M. Donaldson, M.I.E.E., A.M.Inst.C.E., M.C., chief engineer of the company, for their assistance in facilitating the scheme, which, incidentally, is an instance of the readiness and ability of the metropolitan power companies to meet any large demands for electric power which they may be called upon to furnish at short notice.

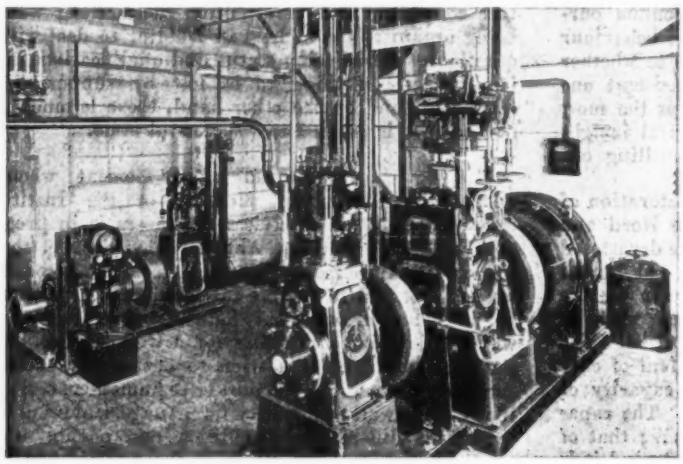


Fig. 1.—Ammonia Compressors for Refrigeration.

The a.c. supply, amounting to some 6,000 kW, is given by the company through two independent 11,000-volt cables that feed three interconnected transformer sub-stations in the exhibition grounds, of a total capacity of 6,500 kVA, which reduce the pressure to 415 volts, 3-phase, for general distribution by means of a 4-wire network. The No. 1 sub-station in the Palace of Industry has needed no modification since last year; it receives one of the incoming e.h.p. supply cables and contains four 500-kVA transformers, the 8-panel h.p. switchboard being of the B.T.-H. cubicle type, and the l.p. 17-panel board of the Ellison ironclad pattern; a 4-panel G.E.C. change-over board is provided.

The No. 2 main sub-station in the Palace of Housing and Transport (formerly Engineering) contains five 500-kVA transformers, with panels of Reyrolle h.p. switchgear and 15 panels of Ellison l.p. gear, all ironclad; and a distribution board interconnected with the No. 1 sub-station change-over board has been installed.

The No. 3 east sub-station behind the model coal mine receives the second e.h.p. incoming supply cable, and contains four 500-kVA transformers with 7 panels of Reyrolle h.p. switchgear, the l.p. 8-panel switchboard in this case being of G.E.C. make.

The a.c. power circuits are 3-phase at 415 volts, while the lighting is carried out at 240 volts single phase. A d.c. supply at 220/440 volts is obtained from a Crompton motor-generator set, consisting of a 415-volt 3-phase induction motor driving a d.c. generator with a static balancer, which has been erected in the main sub-station in what used to be the steam power station. The d.c. supply will be confined to the charging of the batteries for the "Railodok" passenger cars and the electrically-propelled boats on the lake, and to certain services in the Amusement Park.

It should be noted that the d.c. supply needed for driving the "Never-Stop" railway is being obtained from a separate source this year, *i.e.*, a Diesel engine-driven generator, which is being run by the railway entirely independently of the exhibition authorities, for whom Messrs. C. P. Sparks and Partners are again acting as consulting electrical engineers.

As a result of the experience gained in 1924 and to meet the altered conditions brought about by drawing the supply entirely from the North Metropolitan Co., the system of distribution within the exhibition has been remodelled; this work was carried out very economically by utilising re-arranged existing plant, so that very little new gear has been required. Normally, No. 1 sub-station will supply an isolated network, *i.e.*, the western portion of the exhibition covering everything

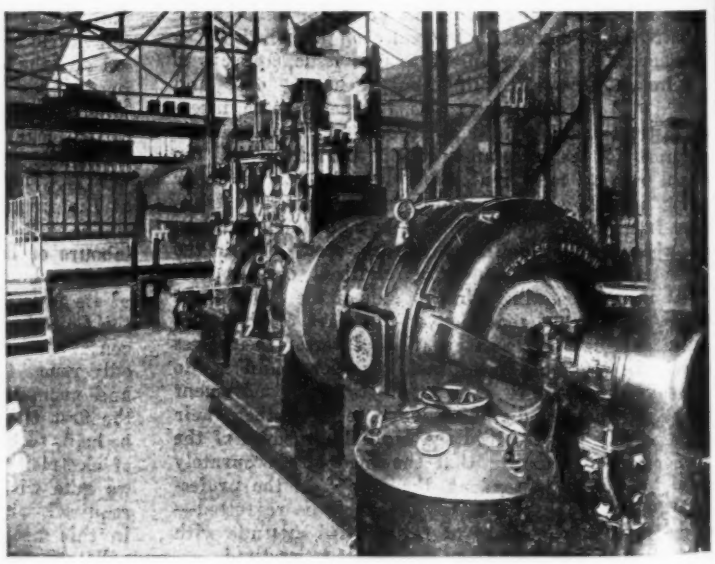


Fig. 2.—General View of Ice-making Plant.

west of the Kingsway and including half the north-west gardens and entrance, the Palace of Industry, the Australian and New Zealand buildings, Civic Hall, south-west entrance, Stadium, and special lighting. Arrangements have been made for interconnecting the networks supplied from the various sub-stations in case of emergency.

**Refrigerators and Air-Compressors.**

To meet the requirements of exhibitors, numerous standard machines of various makes have been installed for the application of electricity to industrial purposes. For instance, the bread baking, biscuit, chocolate, and soap-making plant and various refrigerators are all electrically driven. One of the most interesting examples is to be found near the south-west entrance in the form of Peter Brotherhood plant, which caters for the refrigerating requirements of the many places of refreshment.

In addition to making 20 tons of block ice every day last season, the plant maintained the necessary cold storage temperature in an ice store of about 100 tons capacity, a frozen meat store of 5,000 cu. ft., a chilled meat store of 7,000 cu. ft., and an ice cream room holding 2,000 gallons of that commodity. Each room was kept at a different temperature suited to its contents. The freezing plant includes two ammonia compressors driven by "English Electric" motors of 85 and 15 h.p. respectively, the latter acting as a stand-by for use when only the cold stores have to be dealt with. The larger set is seen in figs. 1 and 2, while the smaller one is visible in the background of the first-named picture. The 85-h.p., 264-r.p.m., motor is a standard L.S. three-phase induction machine, provided with special chemical-proof insulation; it ran practically night and day throughout the summer months. It is started by a "pot" liquid starter, and provided with an ironclad main control switch. The small set is driven by an A.G.S. motor, controlled by an oil-immersed rotor starter seen on the left of fig. 1.

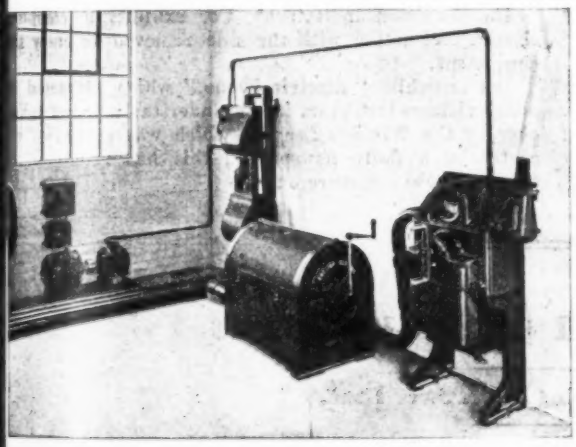


Fig. 4.—Motor and Phase Advancer Control Gear.

In view of the attention that is being given to power-factor improvement, particularly in connection with low-speed motors driving fans, compressors, or similar machines which run for long periods, an interesting method is the use of an "English Electric" oscillating phase advancer, which is connected in the rotor circuit of an induction motor, and supplies the necessary magnetising current. An example of this machine is installed in the compressor room of the model coal mine, where an air compressor by Messrs. Walker Bros. is driven by a standard induction motor of 186 h.p., as shown in fig. 3, in the foreground of which can be seen the associated V10 phase advancer; fig. 4 is a view of the liquid starter, control gear, and the small motor-generator set for supplying direct current for exciting the advancer.

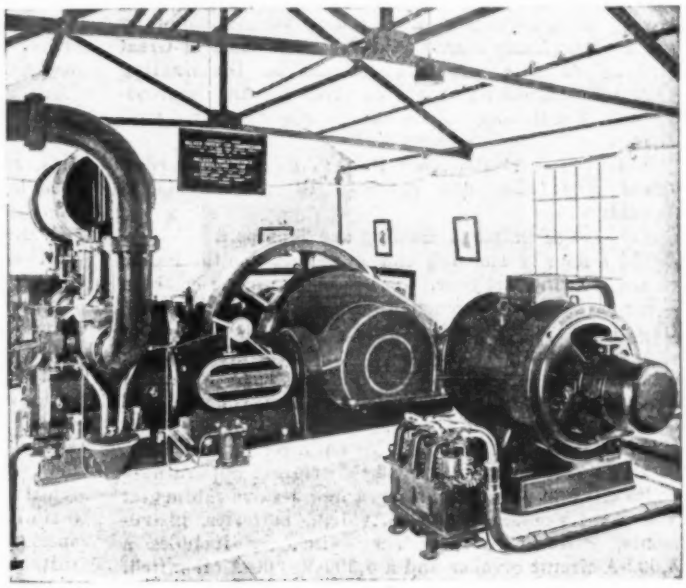


Fig. 3.—Colliery Air Compressor Driven by Induction Motor, with Oscillating Phase Advancer.

**Water Supply, and Lighting.**

For an exhibition of the size of that at Wembley the water supply is naturally of some magnitude. Fig. 5 is a general view of the pump house situated beside the large main reservoir, in which are installed Worthington-Simpson centrifugal pumps coupled direct to motors. The three sets have an aggregate capacity of 120,000 gallons of water per hour, and are controlled by an "English Electric" ironclad unit-type switchboard, which can be seen on the gallery at the far end.

The largest demand for power comes from the Amusement Park, where some good examples of fairly heavy drives by means of "English Electric" A.G.S. class industrial motors are to be seen in the haulage plant operating the three large switchback scenic railways. A drive of this type is somewhat severe, as the full load is thrown on and off quite suddenly as the full ascending cars are coupled to and released from the ropes.

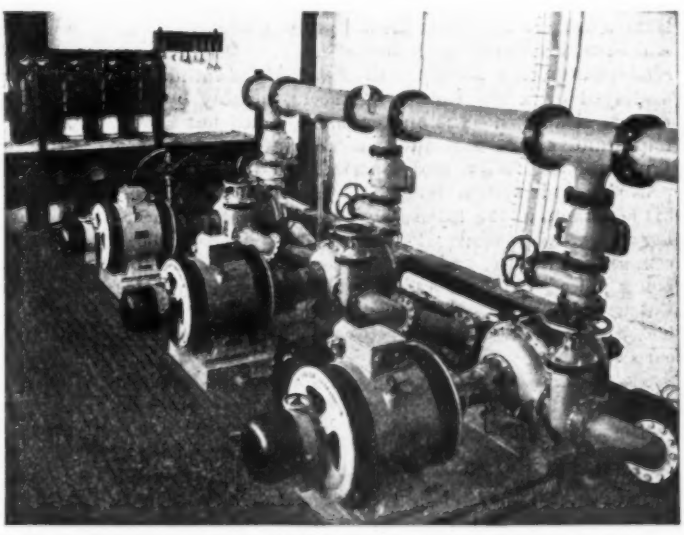


Fig. 5.—Exhibition Pumping House.

Finally, reference must be made to the electric light-

ing of the exhibition, which has been much altered since last season. A greater use has been made of coloured effects, as was foreshadowed in our issue of March 27th last, the scheme of decorative lighting having been developed in an enterprising manner by the Electric Lamp Manufacturers' Association of Great Britain, to which organisation and its illuminating engineers full credit should be given for any improvement in the lighting effects this year as compared with 1924.

The 27th A.A. Battalion R.E. (T.A.), London Electrical Engineers, are running 12 searchlights at Wembley.

**The Palace of Housing and Transport.**

The Palace of Housing and Transport was the Palace of Engineering last year. The change of name has been accompanied by an even more drastic change of aspect. Last year practically every square foot was occupied, but now the building is very badly filled, the stands being comparatively few and widely spaced. There appear to be only six "survivors" from the galaxy of electrical and mechanical wonders which was housed in the building last year. The Edison Swan Electric Co., Ltd., retains its stand, and much of the original apparatus—radio sets and parts (including a new 3-valve cabinet set and a valve-crystal receiver), valves, batteries, instruments, switchgear, &c. The switchgear includes a 3,000-A circuit breaker and a 3,300-V, 300-A oil switch.

Messrs. G. D. Peters & Co., Ltd., have a display which is different in many respects from the one which they had last year. They show a "Wilson" plastic-arc welding equipment, and have a screened compartment on the stand for demonstrating this. Railway signalling and control apparatus is also exhibited. Magnetic Separators, Ltd., shows several examples of its cascade and rotary machines for extracting metal particles from wheat and other substances. The cascade machines consist of a stepped chute, magnets being arranged at each step so that their fields act upon material passing down the chute and yet draw metallic substances clear of the path of the material being treated. The rotary type is equipped with drums in which magnets act upon material passing over them by way of a belt conveyor. Ferrous particles are retained, but fall off when the particular point of the drum reaches its lowest position. Three firms retain the showcases which they held at the original exhibition, *viz.*, Messrs. A. P. Lundberg and Sons, Ltd., who have a display of tumbler switches, plugs and sockets, &c.; Messrs. Evershed & Vignoles, Ltd., measuring and recording instruments, testing sets, radio generators, &c.; and the Record Electrical Co., Ltd., whose case contains circular scale ammeters, ohmmeters, testing sets, &c.

Princeps Electrical Clocks, Ltd., has a collection of dials operated by master clocks similar to that described in our issue of December 5th, 1924 (p.877).

Several radio apparatus manufacturers and dealers have stands this year, among them being Messrs. Read and Burr, who in addition to displaying receiving sets and accessories, are setting up a valve-making plant at which visitors may see for themselves the various processes which lead up to the finished article. Messrs. Kirby (Wimbledon), Ltd., show crystal and valve sets, loud speakers, valves, &c., and Messrs. Bennetts (Electrical Engineers) Ltd., and Read & Morris, Ltd., have a similar display. Diamond Wireless, Ltd., shows some specially wound induction coils and a type of aerial suitable for suspending from the ceiling of a room. This consists of a number of wires in a cloth cover arranged in a seven or eight-foot square. This firm also has examples of amplifiers of very small dimensions.

The Metropolitan Railway Co. exhibits a complete electric locomotive with the side removed to show the equipment.

The erstwhile "Electric Home," which attracted so many visitors last year, is, we understand, being taken over by the Wireless League, which was organised recently by a daily newspaper; this has reference, of course, to the structure only.

# Electricity in Agriculture.

## Artificial Crop Drying as a Power Load.

By H. AMBROSE CARNEY.

DURING the past few years the old problem of haymaking and corn harvesting by artificial methods has received renewed attention, largely as the result of the enthusiasm displayed by a few farmer engineers, notably by Mr. Borlase Matthews. The matter is one which has a very important aspect for all who are interested in the supply of electricity, and especially so where the improved hot air system devised by Capt. B. J. Owen and his assistants at the Institute of Agricultural Engineering at Oxford is used. This system has given excellent commercial results, and the necessary equipment is now being placed on the market at a very moderate price which, it is anticipated, will lead to its adoption by many farmers for dealing with this season's hay and corn crops.

The underlying idea upon which the various methods are based is briefly as follows: The produce—grass or cereals—is stacked as quickly as possible after cutting without preliminary curing or seasoning on the field. Each stack of green produce is constructed with cavities which communicate with the delivery of a powerful fan and through which air is blown by the fan for the purpose of driving out the moisture and conditioning the crop, thereby producing hay from the grass, or dried ripened grain and straw from the green cereal crop. If the green crop were merely gathered into a heap, the complex chemical and enzymic actions which occur during the wilting of the crop, and also the respiration of the still living plant cells, would quickly lead to a high temperature in the mass which eventually would become black and charred if it did not actually take fire. As to what should be done after the green stuff is stacked, two schools of thought have arisen. One, led by Mr. Borlase Matthews, advocates the intermittent use of cold air for temperature control purposes only because it considers fermentation to be necessary for the production of true artificial hay and of properly dried cereals. To the other school, which is represented by the Oxford workers and by Mr. C. Tinker, of Inverness, all fermentation is anathema, and it is emphatic in its contention that the air must be pre-heated so that the stack may be dried completely within a few hours by continuous blowing, which may start even before the rick is completed. The author has seen good samples produced by both the cold and hot air systems, but is satisfied that on scientific and practical grounds the hot air system is the one for the farmer. So far as the preference of the cattle has been observed—and that must always be the final court of reference where cattle foods are concerned—it seems to endorse the hot air system in a very decided way. Comparative chemical analyses which have been made of hay produced in various ways are given in the table below, and although the full significance of the figures will only be appre-

ciated by those interested in animal nutrition, it will be apparent to all that the percentages of fat, carbo-hydrates (starches) and albuminoids or proteins (muscle builders) are greater in the case of the hot blast system, while the percentages of the unrequired constituents, such as water and fibre, are less.

COMPARATIVE ANALYSES OF MEADOW HAY.

| Hay made by | Water | Albumin-oids | Fats | Carbo-Hydrates | Fibre | Ash | Nitrogen |
|---|---|---|---|---|---|---|---|
| Hot blast process | 16·0 | 12·5 | 2·9 | 4 ·5 | 20·9 | 6·5 | 2·1 |
| Weathered on field | 20·0 | 9·0 | 2·2 | 32·0 | 30·2 | 6·5 | 1·5 |
| Fermented in stack | 18·3 | 10·6 | 1·7 | 32·2 | 28·7 | 6·5 | 1·7 |
| Ordinary field methods (Good sample) | 15·0 | 11·7 | 2·8 | 41·6 | 21·9 | 7·0 | 1·9 |

That is to say, there is more nutritive matter—more food value—in 1 lb. of hot-blast-produced hay than in 1 lb. of even the best naturally made hay. According to costs which have been kept very carefully by various workers, there is an overall saving of from 1s. 6d. to 5s. 6d. a ton through the adoption of artificial crop drying, the smaller figure being obtained under the best weather conditions. There are a number of other important advantages which will lead the farmer to prefer the artificial method once he is convinced that the process is within the skill of ordinary farm labour—as it is. These advantages apply equally to the hay and corn crops.

In its present form the hot blast system makes use of oil, a most efficient form of heater having been patented

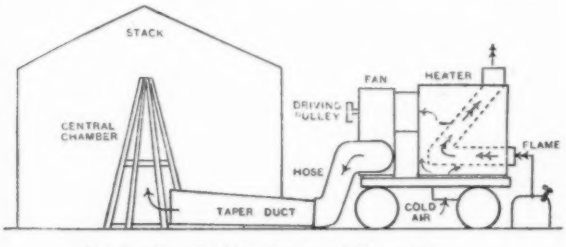



**Fig. 1.—The Hot-blast System of Haymaking.**

and developed at Oxford. The general arrangement of the equipment is shown in fig. 1. The green crop is stacked over and around the central chamber, which consists of a cone shaped frame covered by wire netting. The hot blast from the heater is led to this chamber by means of a tapered duct and a canvas hose. The plant can thus deal with a number of stacks in turn. Blowing usually commences as soon as the rick has been built, and continues for 8 to 10 hours, by which time the drying is completed. This means blowing during the night, as putting up the rick is practically a day's work, but by the provision of dampers dividing the central chamber horizontally into two or more sections, blowing can commence before the stack is completed, thereby obviating night work.

The equipment is shown in action in fig. 2 during the drying of a wheat stack; a Fordson tractor is driving the fan. Ricks up to 20 tons (finished crop weight) can be treated by the plant in 8 to 12 hours.

### Heat Units Required.

Based on the investigation which has been carried out by the Oxford workers, the quantity of air required per minute is normally 5,000 cu. ft., 380 lb., and during its brief passage through the heater its temperature is raised by 45 deg. F. Assuming saturated air (specific heat taken as 0.25), the quantity of heat which is taken up by the blast is:—

$$80 \times 45 \times 0.25 \times 60 = 256{,}500 \text{ B.th.u. per hour.}$$

In the case of electrical heating, 74 kWh per hour would be required (since one kWh = 3,440 B.th.u.). The demand would thus be 74 kW. To the energy required for heating must be added that necessary to drive the fan. This would be approximately 6 kW, so that the standard crop drying equipment may be regarded as a potential consumer of 80 kWh per hour during the summer and autumn nights. The normal run of the plant is 10 hours, during which time it will dry 25 tons of grass to produce 10 to 15 tons of hay or the same weight of cereal crops resulting in 18 to 20 tons of dried straw and grain. From the power supply standpoint the consumptions represented by a ton of hay or unthrashed cereals are respectively 80 and 45 kWh. The possibilities in these figures may be gauged by the fact that in England and Wales alone an area of six million acres of grass crops is cut annually, yielding some eight million tons of hay. This is equivalent to 640,000,000 kWh, or the combined total outputs for 1923 of the Birmingham, Glasgow, Manchester, Sheffield and Leeds undertakings. (The total hay crop of the United Kingdom is about 12 to 15 million tons per annum, representing from 1,000 to 1,250 million kWh.) An area of about 6,500,000 acres of cereals is cut per annum, producing about 11,750,000 tons in the stacks (unthrashed weight), and equivalent to 530,000,000 kWh.

It appears at any rate that in crop drying substantial use can be made of electricity if energy can be transmitted to the fields economically. The load is the more

**Fig. 2.—The Hot-blast Equipment in Action.**

attractive because it occurs from the end of May to September.

### Cost of Process.

With the usual equipment, ordinary paraffin oil is used for the burners and the oil engine or tractor by which the fan is driven. To produce 260,000 B.th.u. requires 14.5 lb. of oil, say, 2 gallons, per hour, allowing for spillage. This costs 2 shillings plus the trouble of taking it to the field. The engine requires from 0.6 to 1.0 gallon per hour, costing, say, ninepence. Such an equipment could hardly be left alone all night, and so would necessitate one of the most reliable men standing by, thereby adding another shilling per hour. Thus without counting anything for depreciation of the oil engine or transport of oil, an hourly charge of 3s. 9d. is obtained. This figure is quite economic for the farmer.

Allowing for losses in the field wiring, a farmer who could buy electrical energy at a halfpenny per kWh would have every reason to prefer electricity, as it would leave all his workers available. In fact in some cases even a penny per kWh might be accepted if it carried some concession on day rates. From the supply standpoint such a load coming on during the summer nights should easily be supplied at a fraction over fuel cost, and even on the lower figure with bulk supplies from modern stations an overall profit should result. The cereal crop which commences in July and continues to September could stand a higher rate for energy, and this might be arranged to equalise with a lower rate for the midsummer night uses.

The magnitude of the load which might be supplied is such that the average nightly demand over the 120 days of the hay and corn harvest would amount to 1,000,000 kW, or 25 per cent. of the total station capa-

city in this country. Allowing 60 hours per week, the weekly load factor during this normally slack period would be about 35 per cent., without counting the day load. The crop drying load would commence about 6 p.m. and continue till 4 a.m. approximately.

It is admitted that if electric ploughing were adopted generally by farmers, the construction of rural lines would be justified. In Great Britain there are 10,000,000 acres under the plough. Taking 40 kWh per acre (which is above the average consumption), the total is only 400,000,000 kWh, or two-thirds the energy required for drying the hay crop alone, ignoring the possibilities of the electric cutting, transport and stacking methods. The ploughing load is a day time one, which may clash with other loads; it is also an intermittent one, and approaches to traction conditions. Desirable as it is, it has not the special advantages which the steady night crop drying demand affords. The combination of the two loads which do not clash with one another fully justifies the construction of lines to outlying fields.

### Will the Farmer Prefer Electricity?

This is the question which will arise immediately in the minds of supply engineers. Supposing that gas were as easily transmitted as electricity, both as regards the efficiency and low cost of mains, one may be perfectly sure that no effort would be spared to see that the farmer made full use of gas. There is no class of business men so sound on economics as the farmers of this country. If better and cheaper ways of working can be proved, they will be adopted provided the initial cost is not too high in proportion to returns. No electrification scheme for farms can be expected to get the support of the agricultural community unless it can be proved beforehand to save money. Much has been said, in speech and print, during recent years of the wonderful things electricity is supposed to be doing on farms, but no one has had the courage to publish a certified balance sheet for an electric farm. Farmers, nevertheless, have reached the point where they admit that electricity may be of some use to them, but only if they can buy it at low rates. This is the official view of the Ministry of Agriculture, and approximates to that of the R.A.S.E. Committee. It is clearly now the duty of the supply authorities to look into the question of cheap and adequate supply. The problem is no longer one of supplying a small load in sparsely populated districts, but, with the successful development of crop drying, that of using plant to better advantage by connecting a summer night load with an average demand of one million kW. The farmer will prefer to use electricity if he can get it at an economic price, because it will save him time and trouble in carrying oil, filling lamps, running an oil engine, and keeping one or more men up all night, thereby depleting his normal working force next day. The design of the heater and the question of cheap field wiring have engaged the attention of the author, and are already well on the way to a satisfactory solution, and need not be counted as obstacles to the development of the load.

Although for the purpose of this article the maximum demand has been taken as 80 kW for the average stack (as this loading reproduces exactly the conditions which have been found best with oil heating), the author fully appreciates that in some cases this demand may be too large for existing lines. There are, however, several methods whereby the maximum demand may be reduced (usually with better load factor), and these have been worked out by the author, and will be dealt with in another article.

The money value of the English hay crop load, taking 640 million kWh at 0.5d., is £1,330,000, or, at 0.375d., £1,000,000. The cereal crop in Great Britain represents £2,200,000 at 1d. per kWh, or £1,100,000 at 0.5d. The combined crop-drying revenue would represent an increase of over 10 per cent. on the total revenue derived from the sale of energy in Great Britain, and it would be secured largely as the result of the better use of existing plant.

# The Design of Cooling Fans.

By W. G. WHITE.

Electrical machines are frequently fitted with fans to assist in cooling the machine. The design of such fans, however, is often determined by rule-of-thumb methods. The speed of the fan is determined by the speed of the set, and the axial length is limited by considerations of space, so that it seems likely that no very substantial improvement in the cooling of a machine can be expected from an improved design of fan alone.

The temperature rise of a machine depends upon the losses occurring in it, the available cooling surface, and the heat conductivity of the materials of which the machine is constructed. The limiting temperature of any part of a machine depends upon the insulating materials used. If, for instance, the armature of a machine is insulated with mica and similar materials, whilst the field winding is insulated with cotton covering, then a temperature rise in the armature greatly in excess of that in the field can safely be allowed.

In this connection the design of ventilating fans might be more carefully considered as, by a suitable design of fan, it appears that the temperature rise of certain parts can be reduced at the expense of an increased temperature rise of other parts. Such a redistribution of heat in the machine would enable its rating to be increased.

The following tests on a 30-b.h.p. motor illustrate the above remarks. The machine was already fitted with a fan of usual design, mounted at the back end of the armature on a spider and so arranged as to leave a large space between the shaft and the internal periphery of the fan. There was a considerable intake of air through this space, and a similar outflow of air from the outer circumference of the fan. It was also definitely ascertained that the amount of air coming into the machine from the commutator end was very small indeed. It was supposed, therefore, that the fan was not so effective as it might have been. In order to verify this, the temperature rise of the machine was measured after running at about full load for four hours, the armature and commutator temperature being measured by thermometer and that of the field by the resistance method. The air space between the shaft and the fan was then stopped up by means of a metal plate. This had the effect of stopping the major portion of the air intake at this point, although quite a lot still found its way in through the joints, &c., and of producing a respectable draught from the commutator end of the machine. The temperature rise of the machine was again measured after running on load as before. The results of both tests, which were repeated, are shown below:—

| | Machine normal. | | With fan modified. | | Average differences % |
|---|---|---|---|---|---|
| Temp. rise of | 1st test | 2nd test | 1st test | 2nd test | |
| Armature ... | 34 | 33.2 | 36.5 | 37.3 | +9.8 |
| Commutator ... | — | 35.2 | 33.5 | 32 | −6.8 |
| Field winding... | 49 | 48.3 | 44.5 | 44 | −9.2 |

It will be understood that the temperatures of the armature and field winding cannot usefully be compared one with another, having been obtained by different methods, but it is clear that whilst the armature temperature rise is increased, that of the field is reduced. It is hoped that the idea presented in the foregoing notes may be of interest to those concerned with the design of electrical machines.

In conclusion, the author wishes to thank the authorities of Brighton Technical College for permission to carry out the tests in the College Laboratory.

**An X-ray Victim.**—The *Daily Mail* states that Dr. Hope Fowler, who is in charge of the X-ray department of the Edinburgh Royal Infirmary, and some time ago lost a part of one of his hands, has had another part removed owing to the effects of the rays.

# The Advantages of Electric Cooking.

### The Case Re-stated.

IN a recent article upon the efforts made by a United States electricity supply company to increase its load by the encouragement of commercial electric cooking, the *Electrical World* re-states in a very convincing manner the superior claims of electricity over other agents in this connection. At the same time attention is drawn to the enormous potentialities of the business. Conditions in the United States are, of course, vastly different from those with which we are familiar; for instance, the country is vastly larger and the dining-out habit is decidedly more prevalent. Nevertheless, the catering business in this country is of substantial dimensions, and a study of American conditions is bound to turn the British reader's attention to the openings which are available in Great Britain. In the United States, it is stated, there are about 190,000 restaurants, hotels, clubs, and bakeries which could use electric cooking, whereas only about 4 per cent. of these actually do so. If the rest were to replace their fuel-fired equipment with electrical appliances their patrons would be better fed, their managements would be more popular and prosperous, and the electrical industry, both manufacturing and supply branches, would benefit commensurately. It is conservatively estimated that the electrification of these establishments would call for equipment valued at $120,000,000 and create a load of 3,000,000 kW.

The satisfactory nature of the load, from the station engineer's point of view, is emphasised. The chief power demand usually occurs in the early morning before the industrial power or street railway peaks, and only to a smaller extent just before meals, for most commercial cooking is done early in the day, and heat is required before meals only to keep food hot or to prepare *à la carte* dishes. In large bread-baking establishments the load usually occurs soon after midnight, and in smaller bakeries early in the morning or late in the afternoon. Small appliances in kitchens produce intermittent loads between the early morning and midnight with a resultant high diversity factor. The commercial cooking load is less affected by business depression than probably any other type of central-station load, with the possible exceptions of domestic lighting and street transportation. It has been found that most installations do not require additional service facilities, the existing cables and meters being quite suitable for the purpose.

Having this in mind, the Cleveland Electric Illuminating Co. set up in its power sales division a consulting service for the purpose of giving advice to prospective cookers by electricity. The company is not engaged in the sale of appliances; its sole interest is the sale of electricity. Its efforts have resulted in a large increase in this type of business during the two years in which the company has paid special attention to the subject. The following are some of the arguments used when presenting the claims of electricity as the best cooking medium. It is stated that the use of electricity results in an improvement in the quality of the cooked food and in the cutting down of waste—contentions which appeal to the customer on the one hand and to the *restaurateur* on the other. Stress is laid upon the cleanliness and ease of electric cooking, and it is pointed out that the heat in an electric oven or grill is absolutely even, there are no "cold" or "hot" spots. Each section of an electric oven is separately heated; thus no more than the energy really necessary is used. No air being needed, there are no air currents to carry away the juices of the meat, &c., and thus reduce its weight. In the electric kitchen there is an absence of soot, dirt, and ashes, and the obnoxious odours which accompany gas cooking.

The useful life of heavy-duty electric cooking equipment is equal to or greater than that of any fuel-fired equipment. This is mainly due to the fact that electric cookers operate at the temperature actually required for cooking, whereas in fuel-fired equipment the temperature is often as much as 500 deg. above the necessary level. Electrical fires, unlike those which often occur with other kinds of equipment, can only result from negligence in installation or operation which is positively avoidable. Another by no means negligible point is that the labour-saving attributes of electricity conduce to the satisfaction and comfort of employés; there is no excessive heat, no fumes, or open flames. For a given output and cooking capacity, electrical equipment occupies far less space than fuel-fired apparatus, and it can be installed in any existing kitchen without necessitating structural alterations.

It is difficult to make a comparison of operating costs, as the conditions in particular establishments vary so widely. One kitchen may have to serve many meals in a short space of time, while another may serve the same number spread over a long period. The cost in the first case would naturally be lower per meal than in the second case. The character of the meals also varies a great deal, and there are other conditions to take into account. It is obvious, however, that any sort of intermittent cooking can be carried out more cheaply by the easily-controlled electrical method than by fuel-fired equipment.

When considering the cost of an electrical installation and comparing it with other equipment, the values of every feature of electrical apparatus must be set against the limitations of other types of apparatus. It is possible to show that if depreciation of electrical equipment be written off over its entire life, the "unit" cost is about the same as for any other type of equipment.

# Charging Storage Cells in Celluloid Cases.

### Precautions Suggested with a view to Preventing Fires.

IN view of the increasing prevalence of fires occurring through charging batteries in celluloid cases from the ordinary supply mains, and having in mind the increasing numbers of small charging stations, often run by a small shopkeeper who has but little knowledge of the forces he is so casually using, Lieut.-Col. G. H. Page, who is an expert in insurance matters, thought it advisable to carry out some actual experiments in order to verify certain theories and views which he had formed as to the causes of those fires. In this investigation he received great assistance from Mr. C. E. Hume, the engineer and manager of the Ramsgate and District Electric Supply Co., Ltd., who devoted much time and trouble to the experiments, and himself made a number of valuable suggestions. Our thanks are due to these gentlemen for the opportunity to give a short account of the investigation.

Without going into the details of the numerous experiments, which appear to leave no doubt as to the risks that are incurred, it may be said that connection was made with the negative live main and the earthed positive main, giving a potential difference of 240 volts, and resistances were introduced into the negative lead in order to limit the maximum possible current to 2 amperes.

When the two terminal wires were applied to a piece of wood which had been impregnated with acids, over 2 inches apart, the whole of the wood between the wires began to char and within 10 minutes had burst into flames.

When a piece of celluloid cut out of an accumulator case, and damp with acid, was then placed on the wood and the wires applied, this time at somewhat over 2 inches apart, nothing was apparent for some minutes, and then a very slight jarring of the bench caused a slight arc, which gradually increased until the celluloid burst into flames.

After an accumulator in a celluloid case had stood for an hour on a piece of impregnated wood, with the live negative main, connected through resistances to limit the maximum current to 3 amperes, attached to one terminal of the accumulator, and the second wire, from the positive earthed main, laid across the wood at a point rather more than 2 inches away from the nearest part of the accumulator on the opposite side from where the negative wire was attached, the whole of the base of the case was found burnt away and the wood charred through.

Observation of the current flow during the experiment showed that for the greater part of the time, the current did not exceed half an ampere.

After an accumulator in a celluloid case had been coupled up on a 240-V, 2-A circuit, with one terminal not properly tightened down, for about 10 minutes, there was a sudden brilliant arc from the loose terminal to the case, and the whole battery blazed up so fiercely that it had to be promptly extinguished to prevent damage to the surroundings.

Other experiments showed that the resistance of a perfectly dry celluloid case was "infinity," and that the resistance of the same case after being partially damped with electrolyte was 8 megohms, and after being damped to represent what appears to be the usual state of many cases when the cells have been strongly gassing for some time, the resistance was such that no reading could be obtained on a Megger; also the resistance of the impregnated wood was too low to produce a reading.

The lessons which are derived from the results of these experiments are the following: Wood should never be used to stand celluloid cells upon, whilst being charged; experience shows that such wood always gets a certain amount of acid impregnation. Celluloid is a perfect non-conductor when perfectly dry, but a very dangerous material when even slightly damped with acid; experience shows that cells, whilst charging, nearly always get at least slightly damp, and often very damp. When the connections to the terminals are perfectly tight, the chief danger arises from any wooden base which they stand on, and although the bottom of the battery may be charred and even burned away, the case itself does not appear to tend to burst into flames until the wood itself ignites and sets fire to the celluloid case. When the connections to the terminals of the battery are at all loose, there is a grave danger of the celluloid case being ignited by an arc at the top, when the whole case burns rapidly with intense heat and a large amount of flame.

An attempt has been made to formulate some suggestions which will have the effect of minimising the risk of fire, and to confine them to simple rules which may be appreciated by the ordinary user, in the hope that he will endeavour to comply with them; after much editing, they have finally reached the forms given below:—

**Suggested Regulations with respect to the Charging of Accumulators from Electric Supply Mains.**

Under no circumstances should any accumulator stand on, or otherwise touch any wood or other absorbent material whilst connected to any live main, and any vertical woodwork should be at least four inches away from any accumulator on charge.

All accumulators, whilst connected to any live circuit, should stand entirely on glass, porcelain, glazed earthenware or slate, which should be kept clean and in a condition to act as an efficient insulator from the earth.

Whenever two, or more, accumulators are being charged in series, there should be a clear space of not less than one inch all round every part of each separate accumulator.

No naked lights, and no smoking, should be allowed within two yards of batteries on charge.

Where supply mains are from a three-wire system (*i.e.*, two live mains and one earthed main), no charging plant should ever be connected to more than one live main, and the second wire should be connected only to the earthed main.

Wherever supply is taken from mains, of which one pole is earthed, the accumulators should always be coupled direct to the earthed pole, with no lamps or other resistances intervening, and the lamps or other resistances should be introduced between the accumulators and the live wire, *i.e.*, the main that is not earthed.

A proper cut-out fuse, not exceeding 10 amps., should be in the circuit between the lamps, or other resistance, and the main switch.

Great care should be taken to see that every wire attached to batteries on charge is securely connected and the terminals securely screwed down; this applies to every connecting bridge and wire throughout the whole chain of cells.

For a stand for a few batteries, an old glazed earthenware sink is excellent, provided the glaze on the bottom has not been damaged. For single batteries a large glass dish, or an old meat dish serves. For a large number of batteries, a few old glazed earthenware sinks are hard to beat, as they tend to sectionise the batteries. Owing to the unevenness of the bottoms of many sinks, there seems to be an instinctive tendency to put wood slats below the accumulators, to give them a firm base to stand on; this should not be allowed; the cells should stand on the sink with no wood intervening.

In conclusion it is pointed out that, even where the proprietor knows the essentials of electricity and understands its use, an "odd hand" is often put on the job of charging the accumulators, or at least of putting them on circuit, a job that is apparently so simple that it does not receive the amount of intelligent attention to small detail to which it is entitled, and which is necessary if fires and accidents are to be avoided.

# Reviews.

**Electric Wiring Diagrams for Motor Vehicles.** By MORTIMER A. CODD, F.Ph.S.; second edition. Pp. 151. Figs. 145. London: E. & F. N. Spon, Ltd. Price 3s. 6d. net.

There are 145 diagrams in this work, dealing with all the leading systems of car-lighting, car starting, and ignition circuits, for British, American, and European motor vehicles, both for magneto and coil arrangements. The diagrams are large and clear, enabling anyone to trace easily the wire connections between any part of the car equipment. In those cases where manufacturers have fitted two or more systems in the same year diagrams have been provided when possible. It is noticeable that the two methods of wiring now under discussion in our columns are both in considerable use, some favouring the method of connecting the secondary coil so that its current passes directly to "earth," or to the framework of the engine, whilst others favour the connection to the primary winding. Particularly clear are the technical wiring diagrams on pages 87, 89, 91 and 92 of the Rotax system, and on p. 143 of the Rolls-Royce system. Although it would add to the cost of production, it would also add considerably to the value of the work if all other systems could be similarly treated. The diagram on page 101 of the Simms magneto is not clear as the secondary coil appears to be earthed on both sides.

The book should be invaluable in all motor garages as a reference work in tracing faults and in replacing wires.

**Principles and Applications of Electrochemistry.** By H. JERMAIN CREIGHTON, Associate Professor of Chemistry, Swarthmore College. Volume 1. Principles. Pp. x + 446. Figs. 76. London: Chapman & Hall, Ltd. Price 20s. net.

The object of this volume is to present a systematic and standardised course of instruction in electrochemistry for chemical students, and to form a general reference book, dealing with the principles and general theory of the subject. The importance to the physical chemist of a sound knowledge of electrochemistry is so great that one is always prepared to welcome a new presentation of the principles involved. Books of this type represent a very great amount of earnest and painstaking effort, and the author is to be commended for the complete manner in which he has carried out his task, the literature of the subject being widely disseminated and often entangled. The volume contains a concise survey of recent investigations into the theory of electrochemistry, recent publications being largely drawn upon in order to bring the subject matter up to date.

It is difficult in the space of a brief review, to deal with a work which covers such wide ground. The volume is divided into twenty-two chapters, and each chapter is further divided into several sections, the whole subject being discussed in a very thorough manner. Throughout the whole volume, the author's theme is developed in a consecutive and orderly fashion, and the whole work appears to the reviewer to be the best general statement of electrochemistry that he has read. It is refreshing to find an expansion of knowledge on such subjects as the migration of ions, electrokinetic phenomena, homogeneous and heterogeneous equilibria, ampholytes and the electrochemistry of gases.

Many imperfectly understood and neglected phenomena are shown to be capable of correlation and receive clear and extensive treatment. The work fills a gap in scientific literature in that it deals in a very lucid manner with a collection of hitherto widely diffused information. The volume contains a mass of material, the selection of which proves a comprehensive knowledge of the literature and bears evidence of careful search by the author. It is strikingly original in many aspects, and its presentation conforms to a high standard of lucidity, exhaustive treatment, and formal logical development. The reviewer finds himself in lively sympathy with several features, such as the elaborate and exhaustive treatment of electrolytic conductance of solutions, the application of the law of mass-action to electrolytic dissociation, hydrolysis and equilibria. The treatment of the recognised aspects of the subjects, such as Faraday's law of electrolysis, electrolytic dissociation and the electrochemistry of gases is very complete and thorough, embracing all recent literature. The chapter on "The Electrochemistry of Gases" is of outstanding importance and interest; it deals with the ionisation of gases, positive ray analysis, and chemical action in high-voltage discharge.

Much of the matter contained in the volume is of comparatively recent development, giving wider aspects to received truths and providing illumination in unexpected directions. Many of the chapters are models of compression, and the references to original papers adequate and fairly complete. One criticism should be registered and that is that the thermodynamic derivations are somewhat meagre and obscure, particularly in the development of the relation between electromotive force and concentration; the reviewer is at a loss to know why Prof. Creighton should choose to develop the relationship from the theory of osmotic pressure in preference to the more substantial and well established basis of Raoult's Law.

Reviewing the book in general, it is certainly a clear, well defined and most useful work, representing a very definite contribution to the existing literature on the subject. The impression left with the reader is that of a thoroughly serviceable, well selected and well arranged mass of material compiled from the best available sources, the whole being characterised by a masterly grasp, breadth of view, clear and methodical exposition. It is seldom that a book can be recommended as wholeheartedly as this volume, and there can be no question as to the value of the work to all students of electrochemistry. The volume is to be followed by another of the same series dealing with the "Application of Electrochemistry," by Colin G. Fink, Ph.D., and its appearance will be looked forward to with keen anticipation.

**Tuning Coils and Methods of Tuning.** By W. JAMES. Pp. 128. Figs. 72. London: *The Wireless World*, Iliffe and Sons, Limited. Price 2s. 6d. net.

There are many methods of constructing coils for receiving circuits, and none has been omitted by the author, who explains also which particular design is best suited for a particular purpose. In addition, the fundamental principles of tuning are clearly explained and can be thoroughly grasped by anyone whose mathematical knowledge goes as far as a square root, in fact, simplicity has been combined with thoroughness in a most commendable manner.

The author is well acquainted with the needs of the serious amateur constructor, a fact that is indeed quite patent from a study of this little book, which is No. 1 of a new series of wireless manuals for which he will be responsible.

The book, which is clearly and adequately illustrated, opens with an explanation of the principles of tuning, passes on to a discussion of various tuning circuits, and concludes with detailed descriptions of the construction and design of all types of single and multilayer coils.

Reference is facilitated by a full table of contents. This book will be of great value to the experimenter who wishes not only to get good results but to understand why it is that he gets them.

**Practical Advice to Inventors and Patentees.** By C. M. LINLEY. Pp. xxx + 126; figs. 8. London: Sir I. Pitman and Sons, Ltd. Price 3s. 6d. net.

To those of inventive frame of mind the book offers helpful advice in many directions, from the framing of an idea to sale of the article. Many suggestions as to what inventions or classes of inventions are likely to prove of commercial value are contained in the early pages of the book. Probably most inventors would welcome the legal advice and information concerning the Patents Office given in Chapter 2, while in Chapter 4 much valuable advice and warning are given to those who are seeking financial assistance in the marketing of an invention. Encouragement is offered throughout the book to the inventor who has a sound proposition, but to the inventor who alone sees the value of his invention, special advice is given.

# Business Notes.

**Engineering Employés' Wages.**—We reported in our issue of May 29th that the executives of the trade unions which are involved in the application for increased wages in the engineering industry had notified the Engineering and Allied Employers' Federation that its suggestions with regard to wages and hours were unacceptable. Last week the Federation replied stating that the employers had come to the conclusion that to add to manufacturing costs would add to the present difficulties, ultimately resulting in an increase of unemployment. The situation, it was asserted, had become worse since the last meeting of the parties, and the unions were asked to "apply their minds with much greater precision to the situation." A further conference was suggested. The unions are to confer again on June 19th to decide what action shall be taken upon this last letter.

In a recent statement, Mr. J. T. Brownlie, president of the E.T.U., said that any attempt of the employers to enforce a longer working week would create a most serious position. He thought that the unions would be able to dissuade them from taking this step, but it was possible that the formidable forces against the men might drive them to taking some extraordinary step. He added that many other industries in the country would view with apprehension any lengthening of the engineers' working week.

**French Limited Liability Companies.**—A law recently passed by the French Legislature provides for the formation of limited liability companies in France and her colonies. Although based to a certain extent on British practice, the powers of such companies are more circumscribed, and there are a number of additional provisions. The shares have to be taken up by the persons subscribing to the memorandum of association, and they can only be transferred to outside persons by the consent of the holders of at least three-quarters of the capital. The capital, which must be divided into shares of 100 fr. each or multiples of this amount, must not be less than 25,000 fr. One of the provisions is that 5 per cent. of the annual profits must be placed to a reserve fund until this equals one-tenth of the original capital.

**The Rating of Machinery.** — The Islington Chamber of Commerce has called a meeting of manufacturers and power users for June 15th to discuss the provisions and effects of the Rating and Valuation Bill which is now before Parliament.

**Large Rectifier Orders.**—POWER-RECTIFIERS, LTD., informs us that during the months of April and May the sales of high-power mercury-arc rectifiers made by their principals, Messrs. Brown-Boveri & Co., reached record proportions. The Illinois Central Railroad Co., Chicago, ordered four 1,500-kW sets; for the railway electrification between Rotterdam and Amsterdam fifteen 1 000-kW sets, each consisting of two rectifiers with a common transformer, have been ordered. A large number of orders have also been received for plants of lower rating, the total number of rectifiers required to fulfil them for the two months mentioned being in excess of the annual requirements of the last three years.

**Threatened Strike at Poplar.**—It was announced on June 9th that the whole of the employés of the Poplar Borough Council would cease work as from midnight on that date as a protest against the decision of the House of Lords to surcharge the councillors in respect of the payment of which were held to be excessive wages. The strike would, of course, have involved the electricity works, and, according to the employés' leader, the men employed by the Bethnal Green Council would have ceased work in sympathy with the Poplar strikers. As we go to press, however, we are informed officially that the strike was "called off" early on Wednesday morning.

**Norwegian Radio Exhibition.**—The Acting British Consul at Oslo informs the Department of Overseas Trade that, according to the local Press, the date of the exhibition of radio goods to be held in Oslo has now been altered. The exhibition will be held from September 24th to October 4th next, and not as originally arranged, from September 1st to 15th.

**Fires.**—An outbreak of fire occurred recently in the celluloid department of the Chloride Electrical Storage Co., Ltd., Clifton Junction. The company states that the fire affected only a small store of portable batteries, and that there will be no interference with the execution of orders.

The premises of Mr. F. Watkinson, electric lighting specialist and hardware merchant, Cowcross Street, E.C., were damaged by fire on May 28th.

On June 9th the premises of the Weston Electric Lamp Co., Ltd., were considerably damaged by fire. Although there were a number of employés in the building, no personal injuries were reported.

**Trade Announcements.**—MR. J. A. ANDERSON, of 1, Eldon Square, Newcastle-on-Tyne, has been appointed district representative in Newcastle by Messrs. Walter McGee & Son, Ltd., of Paisley.

New premises at 64, Myrtle Street, Liverpool, have been opened by the LIVERPOOL RADIO & ELECTRIC SUPPLY CO.

MR. W. S. JOHNSON, who has commenced business at 42, George Street, Edinburgh, as a wholesale electrical factor, wishes to receive manufacturers' show-cards and price lists.

MR. A. C. BORTHWICK, of 149, St. Vincent Street, Glasgow, has been appointed sole selling agent for Scotland for Messrs. Walter McGee & Son, Ltd., Paisley.

THE CONSOLIDATED PNEUMATIC TOOL CO., LTD., has opened an office and service depôt at 2, Harrington Street, Sydney, N.S.W.

MESSRS. HARDMAN & CO., LTD., have removed to the Baum, Yorkshire Street, Rochdale, where they desire to receive trade price lists, &c., for electric lighting supplies.

THE JACKSON ELECTRIC STOVE CO., LTD., has appointed Messrs. Hubert Davies & Co., Ltd., 586/594, Salisbury House, E.C.2, as sole agents for its electric cookers for Natal and the Cape Province, South Africa.

The address of the RUNBAKEN MAGNETO & ACCESSORY CO. is now 270, Deansgate, Manchester. Telegrams: "Runbaken, Manchester"; telephone: Central 3184.

**Catalogues and Lists.**—THE HARVIE CORPORATION, LTD., 11, Queen Victoria Street, E.C.4.—A series of pamphlets, &c., describing "Cemenfortis," a product for the induration and waterproofing of concrete.

ELECTRIC EQUIPMENT MANUFACTURERS PTY., LTD., Normanby Road, South Melbourne, Vic.—An illustrated description of the firm's works, with examples of its switchgear products.

M. EDOUARD HIRSCH, 46, Rue de Paradis, Paris (Xe).—Pamphlets advertising fused basalt insulation and the "Arcturus" soldering iron.

MESSRS. CARTER & MITCHELL, LTD., 21, Allsop Street, Upper Baker Street, N.W.1.—Two illustrated leaflets, one for the trade and the other for the user, advertising the "Victoria" electric cooker.

MR. J. R. MORRIS, Imperial House, Kingsway, W.C.2.—A booklet and folder dealing with "Columbia" dry batteries for radio and other purposes.

MESSRS. L. MCMICHAEL, LTD., Hastings House, Norfolk Street, Strand, W.C.2.—A priced and illustrated folder advertising condensers, transformers, coil-holders, and other radio components.

MAATSCHAPPIJ TOT VERVAARDIGING VAN HOMOGENE KABELS (Homogeneous Cables, Ltd.), 43, Stadthoudersplein, The Hague.—A description of cables insulated with "Karetnja," a bitumastic material, with details of tests.

MESSRS. S. G. LEACH & CO., LTD., 26-30, Artillery Lane, E.C.—An illustrated pamphlet dealing with "Selco" battery-charging equipment.

THE PYRENE CO., LTD., 9, Grosvenor Gardens, S.W.1.—A folder illustrating a number of fire-fighting appliances.

THE GENERAL ACCESSORIES CO., LTD., 125 High Holborn, W.C.1.—An illustrated price list of tumbler switches, lampholders, ceiling fittings, and other electrical accessories.

SIEMENS & ENGLISH ELECTRIC LAMP CO., LTD., 38-39, Upper Thames Street, E.C.4.—June price sheet of electrical accessories and appliances.

AUTOCAR ELECTRICAL EQUIPMENT CO., Mitchell Street, E.C.1.—A priced catalogue of brushes for English, American and Continental automatic dynamos and motors.

MESSRS. D. H. BONELLA & SON, LTD., 46-48, Osnaburgh Street, Euston Road, N.W.1.—An illustrated and priced catalogue of switches, lampholders, plugs and sockets, and other accessories.

AUTOMATIC & ELECTRIC FURNACES, LTD., 173-175, Farringdon Road, E.C.1.—Heat Treatment Bulletin No. 35, dealing with the interdependence of time and temperature in steel hardening.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING CO., East Pittsburgh, Pennsylvania, U.S.A.—Two well produced brochures dealing respectively with domestic electrical appliances and electric fans.

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, S.W.1.—Stock list of motors and dynamos for June.

THE PIGGOTT CONDUITS & CABLE CO., 24, New Bridge Street, E.C.4.—A price list of 600-megohm v.i.r. cables.

MR. G. HOPKINS, 17, Grosvenor Gardens, S.W.1.—A well-illustrated catalogue of air compressors made by Tilghman's Patent Sand Blast Co., Ltd.

THE RELAY AUTOMATIC TELEPHONE CO., LTD., Marconi House, Strand, W.C.2.—A mailing card advertising a private automatic exchange rental system.

CALLENDER'S CABLE & CONSTRUCTION CO., LTD., Hamilton House, Victoria Embankment, E.C.4.—An illustrated brochure describing the "Kaleeco" wiring system.

**Bankruptcy Proceedings.**—RADIO CASH STORES, electricians, late of Islington Leeds, and Nottingham.—The first meeting of creditors was held on June 3rd at Carey Street. The receiving order was made on the petition of Pressland Electrical Supplies, Ltd., on May 14th, upon the levying of an execution and a sheriff's sale. It appeared that Mrs. Josephine Raie entered into a verbal partnership with a person who was in a position to obtain radio apparatus on credit, and a Mrs. de Frece, who contributed sums amounting to about £1,000 in all. Business was commenced in Leeds and proceeded satisfactorily at first, and branches were opened at Nottingham and Swansea, as well as a head office at Islington. The male partner subsequently withdrew and received £150. The other partners, having no experience, appointed a manager at £3 per

week. The premises proved expensive and trade began to fall away. Eventually a creditor obtained judgment against the debtors, the goods were sold by the sheriff, and the business was consequently closed. Mrs. Raie said that she and her partner had only drawn £10 each from the business, and that, apart from the goods sold by the sheriff, there were no assets; she estimated the liabilities at about £1,600. A resolution was passed appointing Mr. C. Latham, 15, Eastcheap, E.C., as trustee of the debtors' estate.

---

A. T. K. MOIR, trading as Moir & Watts, Weardale Road, Lee, Kent, electrical and mechanical engineer.—The receiving order in this matter was made on May 19th on a creditor's petition. The statement of affairs shows liabilities of £2,593, while the assets are estimated at £1,728, from which preferential claims of £41 have to be deducted, leaving net assets of £1,687, or a deficiency of £906. Debtor commenced business with £200 capital in 1908, and the business was successful until 1923, when it depreciated owing to his absence for ten months through illness, and lack of supervision. During 1924 a serious slump arose in the electrical trade, resulting in a trading loss of £1,286, including a loss of £200 upon one contract. In consequence of continued pressure from creditors, commencing in July, 1924, a creditors' meeting was called on May 4th last, and two days later debtor executed a deed of assignment. One of his creditors, however, would not assent and subsequently instituted the present proceedings. Trading accounts for 1923 and 1924 show a profit of £811 and a loss of £1,286 respectively. Debtor became aware of his position in June, 1924.

---

D. JOHNSON, electrical contractor, 177, Woodhorn Road, Ashington, Northumberland.—Trustee, Mr. C. Woollett, Official Receiver, 4, Northumberland Street, Newcastle-on-Tyne, released May 27th.

W. T. ROBINSON AND H. ATTERBY (J. P. Beckett & Co.), electrical engineers, 134, Victoria Street, Great Grimsby.—Last day for proofs for dividend, June 19th. Trustee, Mr. S. M. Forrester, 1, Town Hall Street, Great Grimsby.

A. C. R. BIRKETT, electrical engineer, Radio House, 22 and 24, Wheeler Gate, Nottingham.—Last day for proofs for dividend, June 20th. Trustee, Mr. L. A. West, Official Receiver, 4, Castle Place, Nottingham.

S. C. RAPSON, C. L. BURRILL, AND A. J. HEFFER (Suburban Electrical and Maintenance Co.), electricians, 2, Plough Yard, Shoreditch.—Receiving order made May 20th on debtors' own petition. First meeting, June 17th; public examination, July 7th, both at Carey Street, W.C.

H. A. SANDERS, electrical engineer, The Black Cat Restaurant, Chawston, Beds.—Receiving order made May 29th on creditor's petition.

C. C. S. TRADING CO., electricians, 30, Western Mail Chambers, Cardiff.—Receiving order made May 29th on creditor's petition.

A. THOMPSON (Arnold Electrical Co.), electrical and mechanical engineer, 38, Lucy Street, Hulme, Manchester.—First meeting, June 12th, at the Official Receiver's offices, Byrom Street, Manchester. Public examination, July 10th, at the Court House, Manchester.

V. G. BAINES, electrician, 2, West Street, Wellington.—First meeting, June 9th, at the Official Receiver's office, The Parade, Northampton. Public examination June 12th, at the County Hall, Northampton.

**Company Liquidations.**—W. E. HOLLOWAY, LTD., radio factors, 33a, The Broadway, Hammersmith, W.—The creditors interested herein were called together recently at the above address, when Miss E. Griffiths, the liquidator in the voluntary liquidation of the company, reported that the liabilities totalled £2,275, all of which were due to unsecured creditors. The assets were estimated at £1,872, leaving a deficiency, so far as the creditors were concerned, of £403. It was reported that the company was registered on May 26th, 1924, with a nominal capital of £1,000. The company's principal business had been at Liverpool, and during the period to April 30th last the sales were £5,700, with a gross profit of £1,100. After allowing for expenses, there was a net profit of £187, without taking into account the bad and doubtful debts. It was subsequently found that there were bad debts to the extent of £350. It was stated that one firm were creditors for rather more than £1,300 in respect of headphones supplied to the company. Mr. Clifton, a director, said that it was thought that if the business could be continued it would be a success and eventually all the creditors would receive payment in full. It was decided that Mr. E. H. Hawkins, of Messrs. Poppleton, Appleby & Hawkins, 4, Charterhouse Square, E.C., should be appointed liquidator of the company, with a committee consisting of the representatives of five of the principal creditors.

---

LODGE MUIRHEAD WIRELESS AND GENERAL TELEGRAPHY SYNDICATE, LTD.—A meeting of members is called for July 6th at 2, Wardrobe Place, Doctors' Commons, E.C., to hear an account of the winding-up from the liquidator, Mr. C. F. Wilkins.

**Private Arrangement.**—W. S. BEAUMONT, trading as the Lancashire Wireless and Electrical Depôt, 63, Tithebarn Street, Liverpool.—The creditors interested herein were called together recently, when a statement of affairs was submitted which showed liabilities of £529, all due to the trade. The assets were estimated to realise £297, less £52 for preferential claims, leaving net assets of £245, or a deficiency of £284. It was stated that the debtor commenced the business in September, 1924, with a capital of £500. He had previously been in business in the same line in Yorkshire. Substantial stocks were purchased, but a large proportion had to be sold at cost or less. No trading figures had been prepared, but the debtor thought his turnover had been about £1,500. The drawings had been £4 a week. In the absence of any offer it was decided that the matter should be dealt with under a deed of assignment, while a committee of inspection was also appointed. The following are creditors:—

| | £ | | £ |
|---|---|---|---|
| Oldham & Son, Ltd. ... ... | 44 | Joseph Henry & Co. ... ... | 35 |
| Fellowes Magneto Co. ... ... | 29 | Chorley Rubber Co. ... ... | 21 |
| Western Electric Co., Ltd. ... | 54 | Townsend, Ltd. ... ... ... | 27 |
| Bullen —. ... ... ... | 36 | | |

**Dissolutions of Partnership.**—CHELMSZITE CRYSTAL CO., wireless factors, 10, Godliman Street, E.C.—Mr. H. C. Jefferies and Mr. H. Southgate have dissolved partnership. Mr. Jefferies will attend to debts.

The firm of STEELE, TURNER & WRIGHT, electrical and mechanical engineers, 333, Argyle Street, Glasgow, has been dissolved by the retirement of Mr. Archibald Muir, one of the partners. The business will continue to be carried on by Mr. John Lindsay Turner and Mr. Morris Gordon Wright under the same style.

**The Shanghai Disturbances.**—The serious strike which commenced at a Japanese-owned textile mill in Shanghai and has led to anti-foreign demonstrations, extended last week to the telephone services and the municipal electricity supply undertaking.

It was reported on June 5th that the Chinese operators employed by the Great Northern Telegraph Co. and the Eastern Extension, Australasia and China Telegraph Co. had ceased work.

**Baking Plant for Brazil.**—The Syndicate of Bakers in Puerto Alegre has decided to consolidate the businesses of its members and to introduce the latest types of machinery, and an opportunity will shortly be afforded for the supply of a large bread-baking plant. A central bakery on the most modern lines is to be erected as an experiment, foreign manufacturers of mechanical devices for bread-making being invited to tender for the plant.—*Reuter's Trade Service* (Puerto Alegre).

**Unemployment.**—There was an increase of 1,080 in the number of totally unemployed persons during the week ended May 25th, the total at that date being 1,186,100. The increase in the past twelve months has been 170,470.

**New Paraguayan Tariff.**—According to *Commerce Reports*, the new Customs tariff which is being instituted by the Government of Uruguay on September 1st, places the following goods, *inter alia*, upon the free list:—Electrical tools and instruments and electric transformers. Storage batteries will be subjected to a duty of 20 per cent. *ad valorem*, and carbon batteries to a duty of 0.10 peso per gross kg.

**Swiss Radio Exhibition.**—The *Board of Trade Journal* states that an exhibition of radio apparatus is to be held at Zurich from August 14th to 23rd. Although the regulations demand that exhibitors should be upon the Swiss Commercial Register, foreign goods may be exhibited through the medium of qualified Swiss agents. British manufacturers who desire to display their goods should communicate with their local agents, or, if they have no local agents, with Dr. S. Guggenheim, President, Verband Schweizerischer Radio-Haendler, 3, Bahnhofplatz, Zurich. It will be remembered that in his recent report (which we reviewed in our issue of May 29th), Mr. Sperling, the British Minister at Berne, stated that there were openings for British radio and telephone apparatus.

**New Canadian Companies.**—Among the new companies recently registered in Canada are the following:—The Quebec Southern Power Corporation ($170,000), to supply electricity for all purposes in certain parts of Quebec; the Power Corporation of Canada, Ltd. ($10,000,000 of preferred stock and 250,000 common shares without nominal or par value); Cie Electrique de Ville-Marie, Ltd ($30,000); Canadian Telephone and Supplies, Ltd. ($100,000); and the North-East Electric Company of Canada, Ltd. ($50,000), for the manufacture of automotive equipment and electrical appliances.

**New Canadian Power Undertaking.**—The *Financial Times* says that the formation of the Power Corporation of Canada, Ltd. (to which reference is made above), indicates important developments in the Nesbitt-Thomson group of power companies. The new company will secure stock control of the following companies:—The Ottawa and Hull Power Co. (which controls the Ottawa River Power Co.); the Canada Northern Power Corporation; the Ottawa-Montreal Power Co.; and the East Kootenay Power Co. It will also own a substantial interest in the Southern Canada Power Co., the Winnipeg Electric Co., the Manitoba Power Co., and other concerns. The companies which will come under the Power Corporation of Canada as a holding concern have an installed capacity of 325,000 h.p. and an ultimate capacity of 600,000 h.p. Their capitalisation amounts to about $150,000,000.

**Lead.**—Messrs. James Forster & Co., reporting on June 6th, stated:—"A large consumption is going on, particularly in the sheet and pipe trades, though demand from cable makers still leaves much to be desired. Supplies, on the other hand, are ample for the moment, but arrivals during May, in spite of a longer month, were about 2,500 tons less than during April."

**Indian Electrical Imports.**—His Majesty's Senior Trade Commissioner in India (Mr. T. M. Ainscough, O.B.E.), in forwarding to the Department of Overseas Trade the trade returns giving the total figures for the year ended March 31st, 1925, says that the prolonged depression in the engineering industries is evidenced by a further fall in the total imports into India of machinery and mill work from 19 crores to 14¾ crores. The imports of electrical machinery fell in value from 222 lacs in 1923-24 to 202 lacs in 1924-25. The total imports under the heading "Electrical Instruments and Apparatus," fell from 226 to 197 lacs. The British share shrank from 172 to 141 lacs, that of the United States from 18 to 16 lacs, while that of Germany rose from 16 to 22 lacs.

**Tramway Employés' Wages.**—The Salford Tramway Committee has decided to increase the wages of electricians employed in the department by 8s. per week, and those of linesmen by 4s. per week.

**The German Electrical Industry.**—The Bergmann Electricity Works Company, of Berlin, states that in general the works were well occupied in 1924. The turnover in standard machines quantitatively was greater than in 1913; a favourable development took place in the departments dealing with central station and tramway plant and electric goods vehicles. On the other hand the business in installation materials was quieter owing to the unfavourable building market, and in lamps in consequence of the stocks held by merchants from the inflation period. The selling conditions of the foreign department did not come up to expectations; the duties in Europe hampered exports, while in oversea countries both German and foreign competition was encountered. It is added that the satisfactory state of employment has continued in 1925 with advancing prices, and the orders have shown an increase as compared with the previous year.

The Accumulator Works Company of Berlin, states that the home business in 1924 was satisfactory, although the export trade decreased. It had proved to be of advantage to the company that the importance of the parallel connection of suitably dimensioned batteries of accumulators for bridging over interruptions in working and for meeting the peak load had again become recognised in direct current stations. The demand for central station and portable batteries was very active. The turnover in starter batteries for motor-cars considerably increased, and the use of electric vehicles for the transport of goods experienced a great development. The profits did not keep pace with the degree of activity owing to the high general expenses. The orders received in the early months of 1925 were favourable, although a slackening has now taken place, presumably in consequence of the scarcity of money. Both of the above concerns are paying a dividend of 5 per cent.

**The German Electrical Porcelain Industry.**—The production of porcelain for electrical and other purposes is concentrated in Thuringia, Bavaria, and Silesia. The electrical porcelain industry is in a depressed situation and has to contend with difficulties, including high railway rates. The repeated efforts to secure a reduction in the rates have at last been successful, however, and it is expected that both the home trade and the export business will improve.

**Swiss Import Restrictions Removed.**—The *Board of Trade Journal* publishes a list of goods which the Swiss Government now permits to be imported without special licence. This list includes electric ranges and heating stoves, electric irons, incandescent lamps, accumulators and parts, and wires and cables (not lead covered or armoured).

**The English Electric Co. of Australia.**—According to the Sydney *Daily Telegraph*, the English Electric Co. of Australia, Ltd., intends to defer the presentation of accounts from May to September, in the hope that it will then be easier to compile a profit and loss account. In the absence of any indication of the probable future of the Australian engineering industry, preparation of the account at present is difficult. It is stated that an average profit has been made because of contracts obtained when prices were better. The company has some work to go on with, but Weymouth's shops in Melbourne, are almost empty and that concern, in which the company is interested, has been unable to pay a dividend for the past year. Standard Waygood, Ltd., which is owned by the company, although feeling the effect of keen overseas competition, has earned a profit in its lift manufacturing business. Four years ago the English Electric Co. commenced, at considerable expense, the manufacture of transformers in Sydney and Melbourne, but prices have been cut to such an extent that the business is unprofitable; they are now one-third of the old figures. The Victorian Government recently placed an order for Swedish transformers at what was reported to be a saving of 40 per cent. on local tender prices. The directors of the company state that they do not want to see the Australian standard of living reduced to the level of that of European competitors, and trust that some alternative will be discovered.

**National Joint Industrial Council.** — The sixth annual general meeting of the National Joint Industrial Council for the Electricity Supply Industry was held on May 15th, when it was unanimously resolved to re-elect Alderman W. Walker and Mr. J. Rowan, J.P., as chairman and vice-chairman respectively for the ensuing (seventh) year.

**Local Exhibition.**—BERMONDSEY.—The Electricity Committee proposes to organise an electrical exhibition at the Town Hall in September.

**Book Notices.**—"The Siemens Magazine," June, 1925. Woolwich: Siemens Bros. & Co., Ltd. Price 2d.—This is the first appearance of a house magazine produced under the auspices of the Siemens Sports Club. The journal contains a number of well-written notes and articles in which humour and the personal touch are prominent. There is very little "shop."

"The Year Book of Wireless Telegraphy and Telephony." Pp. lxxii+894; 40 figs. and 72 maps. London: *The Wireless World*. Price 15s. net.—The general features and less bulky form instituted last year have been retained in the 1925 edition, which seems to be as accurate and up-to-date as such a publication can be. The constantly-changing progress in the subject dealt with makes the task of the compilers of the book a by no means enviable one. Besides the tabular matter and general information, indispensable to all who take an interest in radio matters and the list of land stations and excellent maps which have been brought up to date, a number of special contributions are interesting, and extensive information is to be found in the "Scientific Signal" section. Mr. W. H. Nottage writes on the record and development of wireless telegraphy and telephony, Dr. Smith-Rose on "Some Recent Work at the N.P.L.," Captain H. J. Round on "Broadcasting and Loud Speakers," Dr. A. N. Goldsmith on "The Allocation of Wavelengths," Mr. T. L. Eckersley on "Atmospherics," and Captain A. G. D. West on "The Design of a Broadcasting Station."

"Mines and Quarries." Form No. 58. Issued by the Mines Department. Pp. 87. London: H.M. Stationery Office. Price 6d. net.—The book contains the parts of the Abstract and General Regulations required to be supplied to electricians and assistant electricians, together with a memorandum on the Electricity Regulations, under Section 88 (I) (b) of the Mining Industry Act, 1920. Extracts from the Abstract involve the questions of ventilation, safety lamps, shafts and winding, travelling roads and haulage, &c. Extracts from the General Regulations deal generally with the question of employment. The memorandum on the Electricity Regulations deals with the measures necessary to comply with the Regulations in connection with the installation and maintenance of electrical equipment below and above ground.

"Faraday House Journal." Vol. XI, No. 3. Summer Term, 1925.—A feature of this issue is the list of pupils who have secured appointments since the last (February) issue of the Journal; the number is a record. Contributions include an introduction to the automatic telephone system to be installed in London, by Mr. G. E. Williams; an article on the rupturing capacity of oil-immersed circuit breakers, by Mr. B. J. Rowe; and a short description of an interesting hydraulic turbine governor, by Mr. L. J. N. Kirkby; also an early poem by Major C. E. Prince, hitherto unpublished, though one of his best.

"The Advertiser's A.B.C." (848 pp.). London: T. B. Browne, Ltd. Price 21s. net.—This is the 39th edition of this useful guide to the Press of Great Britain and Ireland. It consists of eight sections, *viz.*:—A general index; London dailies; London weeklies; suburban newspapers; magazines and reviews; provincial dailies; class and trade journals; and London offices of provincial papers. Notes upon the characteristics of each journal and of the district which it serves are given.

"A Treatise on Electricity," by F. B. Pidduck. Pp. xiv+664; figs. 385. London: Cambridge University Press. Price 21s. net.

"Metallurgy of Aluminium and Aluminium Alloys," by R. J. Anderson. Pp. xxxi+913; figs. 295. New York: Henry Carey Baird & Co. Price $10 net.

"Proceedings" of the Sixth Convention of the Association of Municipal Electrical Engineers (Union of South Africa), 1924. Durban: The Association. Price 5s.

The *Journal* of the Institution of Engineers (India). Vol. V. April, 1925. Calcutta: The Institution.

**Canadian Manufacturers and Preference.**—The Toronto correspondent of *The Times* reports that a resolution adopted at the recent annual meeting of the Canadian Manufacturers' Association declares that the Customs tariff should be immediately and substantially increased on finished products, and when the higher rates are put into force the Dominion should endeavour to increase the export trade by making preferential tariff arrangements on a reciprocal basis particularly with countries of the British Empire. Another resolution requests the Government to adjust the British preferential tariff so as to equalise the difference in wages and other costs of production in Canada and the United Kingdom. The Association also asks for better protection against the depreciated currencies of other countries.

**An Inquiry into Polish Conditions.**—A delegation of members of the Industrial Group of the House of Commons, including Sir Philip Dawson and Mr. P. J. Hannon (secretary of the group), is at present on a visit to Poland to investigate the industrial conditions and the possibilities of trade.

**South African Mining Supplies.**—From a recent article upon this subject which appeared in *The Times Trade and Engineering Supplement* it appears that the share of Union firms in this business is steadily growing, having risen from 57.2 per cent. in 1920 to 61.7 per cent. in 1924. It must be remembered, however, that many items have perforce to be supplied by local undertakings, *e.g.*, power, water, and food. The same article shows that in the case of electrical machinery (among other items) the sale of American products tends to diminish in favour of British or South African manufactures.

**Electrometallurgy in Brazil.**—The Brazilian Congress has recently passed a Bill authorising the Ministry of Agriculture and Commerce to spend a sum of 1,000,000 milreis on the establishment of an electrometallurgical plant for experimental purposes in connection with the School of Mines in Ouro Preto.

**Electrical Regulations in Chile.**—In anticipation of the enforcement of wiring rules and specifications for electrical materials by the Government, the Cia. Chilena de Electricidad has drawn up a set of rules governing electrical installations.

**The Foreign Interests of the Swedish Ericsson Company.**—It is reported from Stockholm that a scheme for the reorganisation of the foreign activity of the Telefonbolag L. M. Ericsson is on the point of realisation. The idea is that a large part of the foreign interests owned by the company in its existing subsidiary companies should be concentrated in a holding company in London. This company, for which support has been obtained from the Stockholm Enskilda Bank and Hambros Bank in London, would be provided with an ordinary share capital of £800,000, equal to about 14,500,000 kr., of which the Swedish Ericsson Co. would hold £680,000. Moreover, preference shares for £600,000 in this holding company would be issued on the London Exchange. Through the proposed new arrangement the Swedish company, whose claims against its subsidiary company amounted to 9,360,000 kr. at the close of the last financial year, would be provided with a considerable amount of capital, which would render the company independent of bank credits, and at the same time strengthen the undertaking to enable it to maintain its position in the face of keen competition in the markets of the world. It is not intended that the new London company should take over all the foreign interests of the Swedish company. In the first place the interests concerned will probably be the exploitation of the Italian and Mexican concessions, of which the British L. M. Ericsson Co. will get possession. The Polish business will not be affected by the transaction, nor will that in Russia.

**Electrolytic Zinc Production in Norway.**—The Aktieselskabet Tyssefaldene has completed arrangements with the Norwegian Government for the supply of electric power which will enable it to commence the production of electrolytic zinc.

**New Municipal Showrooms and Offices.**—On June 8th, the Ilford Urban Council opened new electricity showrooms at 525, Green Lane. During the current week daily cookery demonstrations are being given.

The offices of the Derby Corporation Electricity Department have been removed from 9, Iron Gate, to larger and more convenient premises at 36, Full Street, Derby.

**Patent Restoration.**—An order has been made restoring Patent No. 142,719 of 1919, granted to H. C. Sanders for "Improvements on electrical apparatus for heating liquids."

**Conditions in Italy.**—A number of notes upon the financial and industrial position of Italy appear in the latest issue of the *Bulletin* of the British Chamber of Commerce for Italy. The Banca Italo-Britannica reports that steady progress continues to be made towards greater efficiency in the public services. Direct cable communication with the United States has been established and the principal cities are being linked to the central cable station at Rome by special lines. The arrangements for handing over the telephone services to private enterprise are practically complete. A number of electrification projects for the speeding up of railway transport are being more vigorously proceeded with. The fears of a water-power shortage engendered by the prolonged dry weather have been somewhat allayed by the abundant rainfall which occurred in February.

An official of the Milan Rotary Club in an open letter, dwells upon the remarkable recovery which Italy has made from the effects of the war which bore very hardly upon the country. He says that in 1921 there were 540,000 unemployed, whereas at the present time unemployment has practically disappeared. Great public works are to be credited with a large share in the reduction of unemployment. New enterprises, particularly hydro-electric undertakings, are continually being launched; it is claimed that the Italians are the recognised specialists of the world in hydraulic work.

## Lighting and Power Notes.

**Aberdeen.**—LOAN SANCTIONED.—The Electricity Commissioners have sanctioned the borrowing of £20,000 to cover the cost of erecting new generating station buildings in connection with the extension of the Corporation electricity works.

**Audenshaw.**—STREET LIGHTING.—At a recent meeting of the Urban District Council, the question of lighting all the main roads in the district by electricity was brought to notice and the surveyor was instructed to obtain an estimate from the Manchester Corporation Electricity Department as to the initial cost and maintenance.

**Birkenhead.**—ELECTRICITY SCHEME.—Important changes in the electricity supply services of the Merseyside are foreshadowed by a recommendation which was submitted to the Town Council on June 3rd. The Corporation's generating station in Craven Street is not capable of supplying the town's demand, and is understood that authority for the Corporation to erect a new station is being withheld. The Electricity Committee has therefore recommended the Council to enter into an agreement with the Liverpool Corporation for a supply of electricity in bulk. It is proposed that the Liverpool Corporation shall provide, lay, and maintain duplicate transmission mains through the Mersey railway tunnel to the Birkenhead generating station and supply electricity for seven years and thereafter subject to determination by twelve months' notice. During the operation of the agreement the Birkenhead Corporation shall not install additional generating plant or obtain electricity in bulk elsewhere. Birkenhead is now receiving a bulk supply from Wallasey, but at the termination of the present agreement the Corporation is to take a minimum supply of 8,000,000 kWh annually from Liverpool. The price fixed for the supply is 17s. 6d. per quarter per kW of maximum demand, plus a fixed charge of .33d. per kWh. In addition a charge of .016d. per kWh will be made for every shilling increase in the price of coal over 15s. per ton.

The Liverpool Corporation has approved the scheme, provided the Electricity Commissioners withdraw their ban upon the installation of new plant at the Lister Drive station.

**Bolton.**—LOAN SANCTIONED.—The Electricity Commissioners have sanctioned a loan of £9,800 for the provision of additional rotary converting plant and switchgear at the Bradshaw Gate and Duncan Street sub-stations.

**Brazil.**—HYDRO-ELECTRIC DEVELOPMENT.—What is said to be the largest hydro-electric plant in South America has been opened on the Ilha dos Pombos, in the Parahyba river, close to the town of Antonio Carlos. The plant is intended to augment by 50,000 kW the existing installation furnishing power to Rio de Janeiro. The transmission line, 155 km. in length, consists of two 3-phase circuits carried on steel towers over which the energy may be transmitted at 132,000 V. The voltage at present in use is 88,000.—*Reuter's Trade Service* (Rio de Janeiro).

**Cambridge.**—PURCHASE OF UNDERTAKING.—A special committee appointed by the Town Council to consider the question of the purchase by the Council of the Cambridge Electric Supply Co.'s undertaking has recommended that notice be given to the company of the intention of the Corporation to exercise its option to purchase the undertaking.

**Cheltenham.**—EXTENSION OF SUPPLY.—The Electricity Committee has approved the scheme submitted by the electrical engineer, to cost £16,000, for the extension of its area of electricity supply.

**Continental.**—BELGIUM.—At the recent annual meeting of the Société des Charbonnages de Beeringen it was reported that in order to meet the increasing demand for electric power in and about the mines an additional 4,000 kW turbo-alternator had been installed at the generating station, bringing its capacity up to 10,000 kW. One electric winding engine was already in operation and another is now undergoing tests.

SPAIN.—Various hydro-electric companies in Spain continued the development of their plants during the past year. The works at Penas de Castro, on the Tagus River, capable of developing 2,000 h.p., have been completed, the Hidroelectrica de Castilla Co. is still working on its 15,000-h.p. plant at Villalba de la Sierra on the Jucar, the Gallega de Electricidad is spending 16 000,000 pesetas on the works in Corunna, on the Tambre, and the Hidroelectrica del Cantabrico is continuing the development of its works of Somiedo, which will double their present capacity. Small installations were completed during 1924 at Ataun, Villafranca, and Deva. The Hidroelectrica Espanola has purchased the works of Tranco del Lobo on the Jucar and increased its central station in Madrid from 12,000 to 20,000 h.p. The Electra de Viesgo during 1924 completed the central station of Santa Cruz de Ujo, at the mouth of the coal mines of the Hullera Espanola. This station, of 15,000 h.p., which may be developed to 40,000 h.p., together with the station of Astillero, Santander, of 2,500 h.p., serves as a reserve for the seven installations which this company has in Santander, Asturias, and Palencia.

GREECE.—Pending the projected increase of capital by the Compagnie des Tramways et Eclairage Electrique de Salonique, the Société d'Electricité et Traction, of Brussels, is advancing the money necessary to proceed with the establishment of a new power station in Salonica. The Belgian Co. is also financially interested in the project for the establishment of a power station for lighting and tramway purposes in Smyrna, work on which is about to be commenced.

**Crook (Co. Durham).**—YEAR'S WORKING.—The first year's working of the Urban District Council's electricity undertaking has resulted in a net profit of £327. The revenue was £3[illegible] and the working expenditure £1,575; capital charges absorbed £1,123, leaving the balance noted. This has enabled the Council to reduce the charges for slot meters by 2d. in the shilling.

**Eton.**—ELECTRICITY SUPPLY.—The Rural District Council has consented to the Slough & Datchet Electric Supply Co., Ltd., utilising overhead cables for a supply of electricity to the Maple Lane district, the company having pointed out that it would cost about £4,000 to carry out the extension underground.

**Gravesend.**—SPECIAL ORDER.—The Corporation is applying for a Special Order to supply electricity to certain parishes in the rural districts of Dartford and Strood.

**Hull.**—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £4,262 for a sub-station and switchgear

**Ilford.**—LOANS.—The Electricity Committee has recommended that application be made for sanction to loans of £30,000 for mains and £2,000 for apparatus.

NEW SUB-STATION.—The Committee is to erect a sub-station at Gnats Hill Cross.

**India.**—MYSORE ELECTRICAL DEPARTMENT.—The important progress that the State of Mysore is making in electrical development, is evidenced in the returns of the electrical department of the State during the year 1924-25. The revenue amounted to Rs. 44¼ lacs, while expenditure amounted to Rs. 23¼ lacs. The expenditure on capital works during the year was Rs. 15 lacs. Work was begun with the sixth installation of plant on the Cauvery Falls at Sivasamudram and the first stage has been practically completed, resulting in a remodelled capacity of 26,000 h.p. The installation of two more sets of 4,000 h.p. is now in progress, while work on the erection of a transmission line which will transmit 10,000 h.p. to Bangalore is also in hand. A transformer station is to be constructed at Kakanhully. It is understood that orders for the required machinery are being placed. The total energy generated at the Falls last year was 158 million kWh, as against 141 million kWh in the previous year. There was an increase both in the number of consumers and in the power consumed. The expenditure on the Cauvery dam and reservoir at Seringapatam amounted to Rs. 235 lacs and the combined capital investment is Rs. 410 lacs. The rate for the supply of electric power is being reduced from two annas to one anna nine pies in the case of small consumers, with a view to encouraging the development of small industries.

**Isle of Wight.**—OPPOSITION TO ORDER.—With regard to the Isle of Wight Rural Electricity Supply Order, 1925, the County Council has lodged a formal objection to the application on the following grounds:—That any powers conferred by the Order ought to expire if they are not exercised within three years; that the proposed maximum price of 1s. per kWh is too high; and that no minimum quarterly charge should be allowed.

**Lancaster.**—ELECTRICITY SUPPLY PROGRESS.—The Corporation Electricity Committee continues to report progress. Private consumption is on the increase since the exhibition of appliances at Scotforth. It has been decided to lay a new feeder cable from Marton Street to Stonewell at an estimated cost of £1,300, and to place a feeder pillar on the Hewerbreaks Estate. The villages of Burton-in-Lonsdale, Caton, and Bentham and the Urban District of Carnforth are asking for supplies.

**Leigh (Lancs.).**—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer, Mr. J. B. Hudson), for the year ending March 31st last, record a total revenue of £38,707, and working expenses of £21,639, leaving a gross profit of £17,068. The figures for the previous year were:—Income, £34,272; working expenses, £18,437; gross profit, £15,835. Capital charges absorbed, £10,494, and capital expenditure provided out of revenue accounted for £1,963, leaving a net surplus of £4,611, as compared with £4,492 in 1923-24. The expenditure on capital account during the year amounted to £10,176, mainly in extensions to mains, and the final instalment towards the cost of a 2,500 kW turbo-alternator. The sales of electrical energy amounted to 4,752,349, as against 3,773,975, and the average price per kWh obtained fell from 2.06d. to 1.87d. The maximum supply demanded rose from 2,260 to 2,650 kW. Pending the consideration of a permanent source for an additional electricity supply, a temporary bulk supply from the Lancashire Electric Power Co., for a period of six months, was commenced on January 1st last.

**Liverpool.**—LOAN.—The City Council is applying for sanction to the borrowing of £45,000 for mains, transformers, switchgear, &c.

**London.**—FULHAM.—The Electricity Committee has recommended that application be made for sanction to a loan of £6,858 for mains.

**Nuneaton.**—ELECTRICITY SUPPLY.—Mr. E. M. Lacy, consulting engineer to the Corporation, has submitted a report on the question of the future development of the Council's electricity undertaking, in which he estimates that the annual cost of obtaining a bulk supply of electricity for all requirements would be £8,633 more than the cost of continuing the present system of partial bulk supply combined with local generation. The Council has considered the report and has decided to apply for sanction to install the necessary alternating current plant for local generation. The estimated cost of the new plant is £79,200.

**Oldham.**—LOAN.—The Town Council is applying for sanction to loans of £50 000 for mains and £15,000 for transformers and switchgear.

**Price Reductions.**—Reductions in the charges for electricity have been made or recommended in the following districts:—

WEST HAM.—Lighting: 4½d. per kWh. Power: 3½d. per kWh.

EGHAM.—*Egham and Staines Electricity Co., Ltd.*—Lighting: From 10d. to 9d. per kWh.

ROTHERHAM.—Domestic supply and general heating: First 100 kWh per quarter, 1½d. per kWh; all energy in excess, 1d. per kWh.

OLDHAM.—Street lighting: From 2d. to 1½d. per kWh.

LIVERPOOL.—Lighting, flat rate: The percentage increase is reduced from 25 to 15 per cent. Power, flat rates: The percentage increase is to be abolished. Rateable value system: The percentage increase on the fixed charge is withdrawn and the increase on the charge per kWh reduced to 20 per cent. The fixed quarterly charge of 5 per cent. on rateable value is to apply up to £100 rateable value, and 2½ per cent. is to be charged on each £1 above £100. Readjustments are also proposed in charges applicable to the Waterloo and Great Crosby districts.

MACCLESFIELD.—*The Electricity Company of Macclesfield, Ltd.*—Lighting: 6½d. per kWh.

**Peterborough.**—HIRE OF COOKERS.—The Town Council is to apply for sanction to a loan of £1,500 for the provision of 100 electric cookers to be let out on hire.

**Rotherham.**—ELECTRICITY IN SMALL HOUSES.—Six Council houses are to be fitted for experimental purposes in connection with electricity for heating and domestic applications.

**St. Helens.**—YEAR'S WORKING.—We have received from Mr. F. N. Rendell Baker, borough electrical engineer, details of the working of the Corporation electricity undertaking for the year ended March 31st last. The total income was £113,483, as against £95,987 in the preceding year, and working expenses were £69,233, as against £56,678. The final result, after deducting interest and sinking fund charges was a net profit of £21,809, which was carried forward to the appropriation account. The sales of electrical energy amounted to 32,063,210 kWh, an increase of 5,151,405 kWh. The works cost per kWh was .493d., and the average price per kWh obtained was .833d.

**Siam.**—ELECTRICAL DEVELOPMENT.—A new 5,000-kW turbo-generator is about to be installed at the central electric power station in Bangkok. Modifications are also in hand in connection with the distribution system, with the object of increasing its capacity.

**Sunderland.**—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer, Mr. A. S. Blackman) for the year ended March 31st last, shows a total revenue of £149,443, as compared with £144,851 in the preceding year. Working expenses amounted to £76,572, as against £76,955, and for the sales department £1,047 was required, leaving £71,823 (£67,895) to be carried to the net revenue account. After paying £18,139 interest on capital and £4,519 for income tax, there was a surplus of £49,636 for the appropriation account, as compared with £46,936 in 1923-24. This was allocated as follows:—Repayment of loans, £30,472; depreciation of stock, £1,003; account collectors' offices and showrooms, £744; conversion of gas lamps to electricity, £750; to reserve fund, £16,666. Loans repaid amount to £464,646, and loans outstanding to £406 686. The output last year amounted to nearly 21¾ million kWh, an increase of over three millions. Nine sub-stations have been put into service and over 18 miles of mains laid, bringing the total to 107 miles. Capital work is in progress at an estimated cost of £274,000; this includes the provision of new main switchgear at Hylton Road, two 10,000-kW turbo-generators, boilers and accessories, cooling towers, mains, and sub-stations. The load factor has been increased to 26.7 per cent.

**Wimbledon.**—LOAN.—The Borough Council is applying for sanction to borrow £10,000 for the purchase of domestic appliances to be let out on hire.

**Wrexham.**—SPECIAL ORDER.—The Rural District Council has applied for a Special Order authorising it to supply electricity in the rural district and in the parishes of Marford and Hoseley.

**York.**—LOANS.—The Town Council is applying for sanction to borrow £10,000 for mains and £4,500 for services.

"ALL-ELECTRIC" HOUSES.—The Electricity Committee has appointed a Committee to visit the "all-electric" houses at Woolwich, and, if necessary, Gateshead, with a view to submitting proposals to the Housing Committee for consideration.

## Tramway and Railway Notes.

**Birkenhead.**—NEW TRAMCAR EQUIPMENT.—The Tramways Committee has authorised the tramway manager to renew the electrical equipment of six tramcars, at an estimated cost of £3,500.

**Canada.**—MONTREAL.—The construction of an elevated tramway is under consideration by the Montreal Tramways Commission, as additional transportation facilities are necessary to alleviate the congestion which now exists in that city, and it is believed an elevated system would solve the question. Plans provide for lines running north and south in Park Avenue, St. Lawrence, St. Denis, Papineau, and Delorimier. It is expected that a definite decision will be reached shortly.—*Commerce Reports.*

**Colne.**—TRACK RENEWALS.—The Town Council has decided to relay the tramway track from the borough boundary to Primet Hill during the present year, at a cost of £9,250, and to renew the track from Cotton Tree Lane when found necessary.

**Continental.**—SPAIN.—La Sociedad Tranvias Electricos de Granada has secured a concession for the construction of a new line between Granada and La Zubia.

**London.**—OXFORD CIRCUS STATION.—The new underground station at Oxford Circus will be ready for traffic early next month. A new booking hall having an area of nearly 8,000 sq. ft. has been constructed, and this will cater for the traffic of both the Central London and Bakerloo lines. Four passimeters will replace the booking offices. The new station will have an annual capacity for 50 million passengers.

SOUTHWARK BRIDGE TRAMWAY.—The extension of the London County Council tramways over Southwark Bridge to Upper Thames Street will be opened in July. No additional fare will be charged for travelling over the extension.

**Sunderland.**—YEAR'S WORKING.—The report on the Corporation tramway undertaking (general manager: Mr. A. R. Dayson) for the year ended March 31st last records a total revenue of £138,819, as compared with £134,331 in 1923-24, of which £1,900 was contributed by the Sunderland District Tramway Co. in respect of through-running powers. Working expenses totalled £101,903, as against £99 501, leaving a gross surplus of £36,916 (£34,830). Interest on capital absorbed £3,180 and income tax £2,340, leaving a net surplus of £31,395, as compared with £29,999 in the preceding year. This was distributed as follows:—Repayment of loans, £10,149; renewal of cars and trucks, £2,838; motor wagon, £547; relaying of kerbs and crossing at Hylton and Chester Roads, £1,781; renewals fund, £16,078. Loans repaid amount to £233,340, and loans outstanding to £31,500, whilst revenue contributions to capital total £50,662. The number of passengers carried was 27,416,009 as compared with 26,438,520 in the previous year.

NEW ROUTES.—The Tramways Committee is recommending to the Town Council that the Tramways Department should carry out the extension authorised in Durham Road, at an estimated cost of £28,098, and also the Derwent Street loop line, which is estimated to cost £5,404.

**Walsall.**—YEAR'S WORKING.—The profits earned by the tramway and motor-'bus services during the year ended March last amounted to £3,000. This is a record for the undertaking. The net profit in the previous year was £14,000, and the previous record was achieved in 1918 (£17,504).

**West Ham.**—LOAN SANCTIONED.—The Town Council has received from the Ministry of Transport sanction to a loan of £35,680 for the reconstruction of the tramways in Romford Road.

## Telegraph and Telephone Notes.

**Argentina.**—LONG-DISTANCE TELEPHONY.—The inauguration took place on May 6th of the new telephone line which renders possible direct telephonic communication between Buenos Aires and the City of Córdoba, in accordance with the decree of May 19th, 1921, which authorised the Union Telephone Company to unite its general system to the local system in Córdoba. The lines stretching across 771 kilometres are in two metallic circuits, that is to say there are four wires, so that the actual length of wire used was over 3,000 kilometres. The line brings into direct and dependable communication the three most important commercial centres of the Republic.

**Hull.**—TELEPHONE SERVICE.—In accordance with the resolution of the Council, a sum equal to 1 per cent. of the capital expenditure has been allocated by the Corporation telephone department to the relief of rates, which makes a total sum of £24,610 paid by the department in rates and taxes for the year ended March 31st last, this being 21 per cent. of the total income. The stations in use number 14,543 the poles 4,044, and the length of conduit 114 miles. Of the total of 43,113 miles of wire, 36,550 miles are underground cables.

**Italy.**—NEW TELEPHONE PLANT.—It is announced by *Commerce Reports* that the Swedish company, Allmanna Telefonaktiebolaget L. M. Ericsson, has just opened its first exchange in Verona. Several additional ones will be built in southern Italy in accordance with the concession granted to the company.

**Radio at Sea.**—BOARD OF TRADE INQUIRY.—In view of the increasing importance of directional radio telegraphy for the safer navigation of ships, the Board of Trade is setting up a Committee to inquire into the subject for its own information and that of Trinity House. The terms of reference are, says *The Times*, as follows:—"To be a Committee to advise the Board of Trade regarding development in the United Kingdom of the service of wireless direction finding stations, wireless beacons or similar aids to navigation, and the location and types of such stations to be maintained." The Admiralty, Air Ministry General Post Office, and Trinity House have been asked to nominate representatives, and Sir R. Burton Chadwick, M.P., Parliamentary Secretary to the Board of Trade, will be the chairman.

**Radio Congress.**—BERLIN MEETING.—The meeting of the Commercial Radio International Committee commenced at Berlin on June 6th. Mr. F. G. Kellaway and Lt.-Col. A. Simpson represented Marconi's Wireless Telegraph Co., Ltd.

## Radio Notes.

**Australia.**—SHIPS' SERVICE.—The Postmaster-General Mr. W. G. Gibson, recently announced that the broadcasting of Australian news from the Government stations at Sydney, Perth, and Darwin to ships at sea was to begin on June 5th.—*The Times.*

**South Africa.**—LONG-DISTANCE FEAT.—A fine exploit was carried out in the Union of South Africa when the Prince of Wales arrived at Cape Town on April 30th. The cheering, music, and speeches which marked the Prince's arrival were carried by land line from Cape Town to Johannesburg with the aid of five repeaters. At Johannesburg—the station call is JB—the audible elements of the welcome were amplified and broadcast. Durban picked up the sounds with the aid of a land line from Johannesburg, and so the broadcasting of an event 1,500 miles from the scene where it took place was accomplished. Speech, it is reported by *The Times*, was generally well heard, though now and again it faded into the intermittent cheering and shouting.

**Spain.**—NEW STATION.—Wireless enthusiasm has taken a firm grip and a brisk business is being done in sets and spare parts, chiefly of French or German manufacture. Serviceable sets of Spanish manufacture are able to compete with foreign articles, owing to the protective Customs tariff, and their manufacture is a prosperous nascent industry, says *The Times*. Broadcasting, however, is still in an initial stage. The Spanish Telegraph Department, which grants the concessions for broadcasting, has chosen for the general characteristic of Spanish stations the letters EAJ, and up to last April 25 stations, numbered from EAJ1 to EAJ25, had been sanctioned or were in course of approval. The Spanish Compañia Nacional de Telegrafia Sin Hilos, holding the Marconi patents, is erecting on the roof of a large general stores in Madrid a 6-kW station, E.A.J.20, and hopes to begin broadcasting on June 15th on a wave-length of 370 metres. One or more of the other Madrid stations will probably then go out of action.

**Station Notes.**—DAVENTRY.—It is stated that the Bishop of Peterborough will inaugurate the new high-power station at Daventry next August. Electricity is being obtained from Northampton at 11,000 volts and transformed to 375 volts, 3-phase, for driving the station machinery, one phase being tapped for lighting at 210 volts. *The Times* records that the 500-ft. masts have already been erected to a height of 200 ft., and each will have a light at the top as a warning to aircraft. The masts are triangular and of lattice-work pattern with a ladder running up inside. The power-house and offices are combined in one big brick building over 120 ft. long and 65 ft. wide. There are five motor alternators and three motor generators for supplying the power, controlled from a single switchboard. The wireless room is the largest and in addition to it, there are a small test studio, instrument room, battery room, amplifier room, and two offices. There will be five or six resident engineers at Daventry.

The aerials are of the "T" type, the top span of which is 600 ft. long, while the vertical section is 450 to 460 ft. The earth system consists of wires from the point where the aerial leads in brought to the ground in a circle of 100 ft. radius and attached to buried zinc plates. The power will be 25 kW input to the oscillator and the station will be known as 5XX, operating on a wave-length of 1,600 metres. The station occupies 25 acres on a 35-acre site.

NEW STATION.—It is understood that when the Daventry station is completed plans will probably be put in hand for the construction of a second station in the same neighbourhood. A second station, working on a wave-length of 300-500 metres, would offset the advantages which the Germans will otherwise reap with their new high-power station near Berlin and would cater for the East Coast listener. A development of the future seems to be in the direction of constructing a very short wave station working on, say, 80 metres or thereabouts.

MANCHESTER.—It is reported that steps are being taken to increase the power of the Manchester (2ZY) station so as to improve the service in Lancashire before next winter.

**United States.**—SUBTERRANEAN TRANSMISSION.—It is reported that Dr. James Rogers, of Hyattsville, Maryland, recently conducted experiments with broadcasting on a low wave-length through the earth. An interesting point was the almost complete absence of static interference. The transmitting antenna system consisted of four cables, each 50 ft. long, buried 3 ft. under the ground so that they radiated from a central point along the four points of the compass. The cables were constructed of terra-cotta piping, 18 in. in diameter, within which was laid copper tubing ¾ in. thick and packed in insulating glass, the direction being determined by which of the four legs was employed. Reception was by means of the usual type of ground aerial.

## Contracts Open and Closed.

*(The date given in parentheses at the end of the paragraph indicates the issue of the* ELECTRICAL REVIEW *in which the "Official Notice" appeared in our advertisement pages.)*

### Open.

**Australia.**—MELBOURNE.—July 1st. Victorian Railways. Electric cable.*

June 15th. City Council. H. and l.p. 3-phase sub-station switchgear.

SYDNEY.—August 5th. New South Wales Railway Commissioners. Two ash conveyors for the White Bay power house.

**Acton.**—June 26th. Corporation. Steam engine and dynamo for the Public Baths. (See this issue.)

**Aylesbury.**—Electricity Works. One 400-kW rotary converter. (See this issue.)

**Belgium.**—June 19th. Municipal authorities of Brussels. Two electric lifts in the Palais du Midi. Particulars for 8 fr. from Hôtel de Ville.

June 22nd. Belgian State Railway authorities (Office de Electricité, 25, Rue de la Charité, Brussels. Underground cables for Antwerp, Schaerbeek, and Brussels-Midi. Particulars (Cahier des Charges Special No. 4-514) for 2½ fr.

**Bradford.**—June 13th. Corporation. Electric lighting installations, 194 houses, in connection with housing schemes. Specifications from the City Architect, Town Hall.

**Canterbury.**—June 22nd. Electricity Works. L.p. lead-covered and armoured cables. (See this issue.)

**Cardiff.**—June 20th. Board of Guardians. Installation of electric lighting (cables and wiring) at the City Lodge Institution. Specifications (£5 5s.) from Messrs. Arthur Ellis and Partners, 9, Park Place, Cardiff.

**Darlington.**—June 30th. Electricity Department. One 6,000-kW turbo-alternator, condensing plant, and two 40,000-lb. per hour water-tube boilers. (June 5th.)

**Dartford.**—June 20th. Electricity Works. 1,420 yd. cable, disconnecting boxes, &c. (See this issue.)

**Eccles.**—June 29th. Electricity Committee. One 1,300-kVA Scott-connected transformer group. (June 5th.)

**Egypt.**—CAIRO.—Inspecting Engineer to the Egyptian and Sudanese Governments, Queen Anne's Chambers, London, S.W. 24,350 kilos copper wire and rods.

**Fleetwood.**—June 22nd. Electricity Department. One water-tube boiler, superheater and mechanical stoker. (See this issue.)

**Grimsby.**—June 29th. Electricity Department. Cooling tower superstructure and pipework. (See this issue.)

**Hull.**—June 18th. Electricity Department. Two 7,000-kW turbo-alternators and condensing plant. (May 29th.)

**India.**—June 23rd. India Store Department. Six electric Scotch derrick cranes, 25 and 10 tons.

**Leeds.**—June 15th. Education Committee. Electric lighting of schools. Specifications from Architect's Section, Education Department, Calverley Street.

**London.**—STEPNEY.—June 24th. Board of Guardians. Electrically-driven lift and building work in connection with it. (June 5th.)

WESTMINSTER.—June 17th. Board of Guardins. Supply of 21 British Ericsson auto-reset-type 25-line telephone instruments or other approved instruments at the Board's offices. Mr. W. J. Lickey, clerk to the Guardians, Guardians' Offices, Princes Row, S.W.1.

LONDON COUNTY COUNCIL.—June 25th. Wiring and fitting for electric lighting five blocks of flats on the East Hill estate. (See this issue.)

June 29th. Electric lighting installation at Holcroft Road School, Hackney. (See this issue.)

METROPOLITAN ASYLUMS BOARD.—June 22nd. Installation of electric lighting at Highwood Hospital, Brentwood. (See this issue.)

**Manchester.**—June 16th. Electricity Committee. Cast or wrought steel pipes and flanges, Stuart Street station; centrifugal oil purifier, Barton power station. (May 29th.)

**New Zealand.**—WELLINGTON.—July 21st. Public Works Department. Two electrically-operated water-level indicators.*

**Normanton.**—June 27th. Electric lighting installation at the Boys' Grammar School. Specifications from Mr. T. R. Robinson, Clerk to Governors Technical School, Normanton.

**Rochdale.**—July 1st. Electrically-driven air compressor for Roch Mills sewage disposal works. Mr. S. H. Morgan, borough engineer, Town Hall.

**South Africa.**—CAPE TOWN.—June 22nd. Electricity Department. Pole line hardware, insulators, bare copper wire, tubular poles and insulated wire.*

June 22nd. Pumping equipment: Two motor-driven pumps, switchgear, &c. (A.X. 2,086.)*

**Southend-on-Sea.**—Light Railways and Electricity Department. Traction storage battery. (May 29th.)

June 17th. Ten tons best bitumen (in barrels) for use in laying underground cable. (See this issue.)

**Thirsk.**—July 14th. Electrician's work required in erection of Thirsk and Sowerby Institute. Particulars from Mr. C. Lee, Millgate, Thirsk.

**Tunbridge Wells.**—July 8th. Electricity Committee. One 3,000-kW turbo-alternator, with condenser, piping, and cables, one cooling tower, steam piping, &c. (June 5th.)

**Turkey.**—STAMBOUL.—July 7th. Posts and Telegraphs. 365 tons of iron wire, 2 tons brass wire, and 5,000 copper couplings.*

**Walthamstow.**—June 15th. Education Committee. Electric lighting installation at the Selwyn Avenue School, Higham's Park. (May 29th.)

**Warrington.**—June 23rd. Electricity and Tramways Committee. L.p. paper-insulated lead-covered cables. (See this issue.)

**Winchester.**—July 10th. Electricity Department. One 1,250-kW, d.c. geared turbo-generating set, with condensing plant, &c. (See this issue.)

**Worksop.**—June 27th. Electricity Department. Two Diesel or semi-Diesel engines, direct coupled to two 300-kW d.c. generators; engine room extension; overhead travelling crane; oil storage tanks and pumps. (See this issue.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room) 35, Old Queen Street, S.W.1.

## Closed.

**Australia.**—MELBOURNE.—Electricity Commission of Victoria. Accepted:—

Switchgear and accessories (£28,166).—Metropolitan-Vickers Electrical Co., Ltd.

City Council. Recommended:—

300 ornamental street lanterns (£4,135).—Australian General Electric Co., Ltd.

SYDNEY.—Electricity Supply Committee. Recommended:—

Relays (£2,049); current transformers (£381); trip coils and escutcheon plates (£204).—Metropolitan Vickers Electrical Co., Ltd.

Potential transformers (£587); trip coils and escutcheon plates (£113).—British Thomson-Houston Co. Ltd.

Trip coils and escutcheon plates (£335).—Ferguson, Pailin, Ltd.

—Tenders.

**Birkenhead.**—Water Committee. Accepted:—

Turbo pump electric motor, and control gear at Tranmere reservoir (£282).—Holden & Brook, Ltd.

**Bombay.**—Standing Committee. Accepted:—

700 yd. cable (Rs. 965).—W. T. Henley's Telegraph Works Co., Ltd.

**Carnarvon.**—Electricity Committee. Recommended:—

Underground cable (£155).—National Electric Construction Co., Ltd.

**Bradford.**—Tramways Committee.

700 welding portions (20s. each).—Thermit, Ltd.

10 tons welded rings, 1 ton clips, and 1 ton bolts (£244).—Sutcliffe Bros.

Copper bonds.—British Insulated & Helsby Cables Ltd.

35 tons ½-in. round mild steel (£372).—Robert Heath & Low Moor, Ltd.

5 tons steel tie-bars (£92).—Bayliss, Jones & Bayliss.

**Canterbury.**—Town Council. Accepted:—

Steel platform for the new turbine at the electricity works (£239).—Edward Wood & Co.

Steam and low-pressure pipework (£538).—John Spencer, Ltd.

**Doncaster.**—Town Council. Accepted:—

Transformers (one 150- and seven 100-kVA sets) (£1,110).—General Electric Co., Ltd.

E.h.p. switchgear (£1,119).—Ferguson, Pailin, Ltd.

E.h.p. cables (£3,578); l.p. cables (£4,927).—Callender's Cable & Construction Co., Ltd.

Education Committee. Accepted:—

Installing electric light in King Edward Road boys' school and alterations to the installation at Wheatley Park boys' school (£108).—Isle & Jarrett.

**Egypt.**—Allmanna Telefonaktiebolaget L.M. Ericsson, of Stockholm, has obtained the contract at £60,000 for the installation of the new city telephone exchange and subscribers' instruments. British, French and Italian firms also tendered.—*Reuter's Trade Service* (Cairo).

**Finchley.**—Electricity Committee. Accepted:—

H.p. switchboard.—General Electric Co., Ltd.

**Hull.**—Tramways Committee. Accepted:—

Tramcar axles.—Vickers, Ltd.

Laying tramway along Chamberlands Avenue and Cottingham Road (£11,743).—Sangwin, Ltd.

**India.**—Calcutta Electric Supply Corporation. Accepted:

Main switchgear (metal-clad vertical drop-down type) for the new Southern power station.—Ferguson, Pailin, Ltd.

**Irish Free State.**—DUBLIN.—For the electric wiring of 180 houses on the Marino Housing area only two tenders were received by the Borough Commissioners, *viz.*:—Using C.M.A. wire—Roche & McConnell, £2,601; Dublin Corporation Electricity Department £2,550. Using Continental manufactured wire—Roche & McConnell, £2,439; Dublin Corporation Electricity Department, £2,318. Commissioner Dr. W. Dwyer recommended acceptance of the Electricity Department's tender, stating that he was of opinion that the Cable Makers' Association guarantee was worth paying additional money for, but that it was rather difficult to make a conclusive case as against the lower-priced Continental wire. He recommended, however, that in this instance the latter wire be used on condition that results of tests are submitted showing that the material is equal to that of the Cable Makers' Association.

**Lamp Contracts.**—Contracts have been placed with the Siemens & English Electric Lamp Co., Ltd., for 12 months' supply of electric incandescent lamps for the London County Council and for a large quantity of vacuum lamps for train lighting, for the London, Midland & Scottish Railway.

**Leeds.**—Tramways Committee. Accepted:—

10 long wheel base trucks (£145 per car set).—Electro Mechanical Brake Co., Ltd.

**London.**—EALING.—St. David's Hospital. Accepted:—

Electrical installation.—Ridout & Ratcliff, Ltd.

STEPNEY.—Electricity Supply Committee. Recommended:—

880 yd. .607 sq. in. cable.—W. T. Henley's Telegraph Works Co., Ltd.

Conduits and troughs and covers for 12 months :—

| | |
|---|---|
| **Albion Clay Co., Ltd.** (Recommended.) ... ... ... | **£3,033** |
| Doulton & Co., Ltd. ... ... ... ... ... ... ... ... | 3,088 |
| Sutton & Co. (Overseal), Ltd. ... ... ... ... ... ... | 3,115 |
| Siemens Bros. & Co., Ltd. ... ... ... ... ... ... ... | 3,417 |
| W. T. Henley's Telegraph Works Co., Ltd. ... ... ... | 3,568 |

Electricity meters for 12 months :—

| | |
|---|---|
| Aron Electricity Meter, Ltd. (not to specification) ... ... | £2,675 |
| **Reason Manufacturing Co., Ltd.** (Recommended.) ... | **3,343** |
| Measurement, Ltd. ... ... ... ... ... ... ... | 3,631 |
| Edison Swan Electric Co., Ltd. ... ... ... ... ... | 3,825 |
| Chamberlain & Hookham, Ltd. ... ... ... ... ... | 4,241 |
| Ferranti, Ltd. ... ... ... ... ... ... ... ... | 4,241 |

Time switches for 12 months :—

10-Ah (£462).—Horstmann Gear Co., Ltd.
25-Ah (£400).—Venner Time Switches, Ltd.

**Maidenhead.**—Town Council. Accepted:—

Switchgear in connection with the bulk supply (£479).—British Thomson-Houston Co., Ltd.
A.c. voltage regulator (£672).—British Electric Transformer Co., Ltd.

**Manchester.**—Tramways Committee. Accepted:—

Tramway circuit breakers.—Metropolitan-Vickers Electrical Co., Ltd., and General Electric Co., Ltd.
Phono-electric trolley wire.—Equipment & Engineering Co., Ltd.

Electricity Committee. Accepted :—

Cable.—Callender's Cable & Construction Co., Ltd., and British Insulated & Helsby Cables, Ltd.

**Oldham.**—Electricity Committee. Accepted:—

Small frames and covers.—John Hall (Oldham), Ltd.
Earthenware ducts.—Doulton & Co.
Cable.—Union Cable Co., Ltd.

**Peterborough.**—Electricity Committee. Accepted: —

Overhead line to new Peterborough brickfields (£607).—Callender's Cable and Construction Co., Ltd.
Improvement of pulverised fuel plant (£650).—Simon-Carves, Ltd.

**Richmond-on-Thames.** — Education Committee. Accepted :—

Installing electric light at Darell Road schools (£230).—A. Hayes (Richmond Electric Installations).

**Rotherham.**—Electricity Committee. Recommended:—

Cable.—Callender's Cable & Construction Co., Ltd. (£1,860); Edison Swan Electric Co., Ltd. (£1,104 and £284).

**Salford.**—Electricity Committee. Recommended:—

Cable (£1,630).—W. T. Glover & Co., Ltd.
L.p. cable (£440).—Hackbridge Cable Co., Ltd.

Tramways Committee. Recommended :—

One pair bogies (£286).—J. C. Bull Co.

**South Africa.**—DURBAN.—Municipal Council. Accepted :—

¼ mile .2/0 sq. in. cable (£628); 10 tons bare copper wire (£910).—T. Barlow & Sons, Ltd.
1 mile .06 sq. in. cable (£380).—British General Electric Co., Ltd.
½ mile .2 sq. in. cable (£578).—H. Davies & Co., Ltd.
Piping, fittings, &c., for power station (£347).—G. Hamer & Co., Ltd.

JOHANNESBURG.—Town Council. Accepted :—

Four Westinghouse-type traction motors (£360).—S. Thompson.
2¼ miles copper trolley wire (£240).—Griffin Engineering Co., Ltd.
11 miles underwriters' wire (£853).—United States Rubber Co. (S.A.), Ltd.
7¼ miles copper trolley wire (£881); 53 miles underwriters' wire (£1,939).—Telegraph Manufacturing Co. (Col.), Ltd.
Two 1,000-kVA transformers (£1,220).—Siemens (S.A.), Ltd.
Switchgear and transformers (£16,666).—Metropolitan-Vickers Electrical Co., Ltd.
Pipework pumps, &c. (£14,970).—Reunert & Lenz, Ltd.
—*South African Power Engineer.*

**Wimbledon.**—Electricity Committee. Recommended:—

Two 200-kVA transformers (£350).—Foster Engineering Co., Ltd.
Four 100-kVA transformers (£412).—Hackbridge Electric Construction Co., Ltd. Four 100-kVA transformers (£476).—British Electric Transformer Co., Ltd.

## Forthcoming Events.

**Incorporated Municipal Electrical Association.**—June 15th to 20th inclusive. Annual Convention at Brighton.

**Batti-Wallahs' Society.**—Wednesday, June 17th. At the Hotel Cecil. At 1 p.m. Luncheon. General Sir Ian Hamilton, G.C.B., will speak on "Industrial Enterprise."

## Notes.

**Legal.**—STERLING TELEPHONE AND ELECTRIC CO., LTD., *v.* HASSETT.—This case was transferred from the High Court of Justice, Dublin, to the Limerick Circuit Court (*vide* ELEC. REV., May 8th, p. 732), and it came before Judge McElligot recently. The plaintiffs claimed £144 for goods supplied to the defendant, while the latter, a Limerick engineer and ironmonger, stated that the goods were unsaleable. The plaintiffs stated that the radio sets supplied to the defendant were capable of "tuning in" stations within a considerable radius of Limerick, provided the operator was anyway skilful. This had been proved by one of their representatives at Limerick. For the defence it was contended that customers had been lost through the inability of the sets to pick up the Chelmsford station, and a loud-speaker supplied was faint and did not give satisfactory results. The Judge gave a decree to the plaintiff firm for £29 13s. 1d.

**The Shannon Electricity Scheme.** — By the end of the month the Irish Free State Government expects to have the Shannon Electricity Bill ready for the signature of the Governor-General (Mr. T. M. Healy), who signifies the King's assent. The measure has already passed the Dail, or Lower House of Parliament, and is well advanced in the Senate. Mr. McGilligan, Minister of Industry and Commerce has already intimated that it is hoped to make a beginning with the carrying out of the scheme about September, and it is understood that, although the contract goes to the Berlin firm of Siemens, Irish labour will be employed as far as possible. Mr. Blythe, Minister of Finance, announces that he anticipates no difficulty in raising the money, amounting to five millions sterling, which will be required.

Opinion in the Free State is keenly divided regarding the desirability of the scheme, in view of the financial conditions that prevail. Parliamentary circles, however, appear to have accepted the return of Government candidates at recent by-elections as constituting a mandate to proceed. This certainly is the view taken by the Executive Council (Cabinet), which more or less ignores solemn warnings that the electricity supply will not be required for such a great area for at least another generation.

Mr. McGilligan, at the Dublin Chamber of Commerce, mentioned the controversy as to withholding documents and details, and said he had only withheld one document—a list of prices—and he would continue to withhold it. Mr. David Barry, an influential member of the Chamber, said the money would be better devoted to the development of agriculture. He also asked the Government to appoint an advisory committee on the Shannon scheme, but was told that the Government was the people's advisory committee.

Mr. Blythe's claim is that, as the Free State revenue is £23,000,000, £5,000,000 for the Shannon undertaking is not a matter of magnitude. There is a big difference, he holds, between borrowing for expenditure that would give no return, and borrowing for capital works. If they borrowed for the latter purpose, the bigger their national debt—within reasonable limits—the better.

It may be recalled that Prof. Rushworth, University College, Galway, was appointed chief engineer of the scheme on behalf of the Government. Mr. J. Prendergast, M.E., who has been offered the post of resident engineer, has recently been in charge of the new railway system in North Wales, and has had considerable experience in electrification in that area. The Selection Committee has also appointed Mr. R. Tennant, B.E., son of Mr. R. A. Tennant, American Consul at Galway, as one of the engineers, and he is now engaged in the superintending of boring operations at the Limerick end.

**Longest Belt Conveyor System.**—We are informed that what is thought to be the longest belt conveyor system in the world, which is in service at East Roscoe, Penn., has been pronounced an operating success. This conveyor system is carrying run-of-mine coal more than four miles from a central car-unloading point to waiting barges in the Monongahela river. The conveyor consists of twenty separate belts, each driven by an electric motor. The belts provide a continuous passage for the coal, each taking its load an average distance of 1,146 ft. and then passing it on to the next. The conveyor moves an average of 1,229 tons per hour, and requires an average of .170 h.p. per 100 tons per 100 ft. The driving motors, which are of G.E.C. (America) manufacture, vary from 50 h.p. to 175 h.p. Peculiar topographical problems led to the use of this conveyor system instead of a railroad line to carry the mine output from the main shaft mouth to the river barges.

**An American Automobile Lighting Association.**—Thirty-five manufacturers of electric lighting equipment in the United States have recently organised in Chicago the Automotive Lighting Association, the object of which is the betterment of motor vehicle lighting.

**X-ray Therapy.**—The new X-ray, radium, and local-treatment department of the Royal Devon and Exeter Hospital was opened on the 5th inst. by the Countess Fortescue in the presence of a representative company. Mr. P. F. Rowsell (president of the Pharmaceutical Society), acting in the capacity of chairman of the Devon Concert Fund, handed to the president of the hospital a cheque for £5,000 towards the purchase of the new deep X-ray therapy apparatus and a supply of radium. It is claimed to be the only deep X-ray therapy apparatus of its kind in the kingdom. Various rooms are allotted for local treatment of cancer, high-frequency superficial treatment, and X-ray deep treatment, radiographic and fluoroscopic dressing, massaging and exercise.

**The Substitution of Electricity for Gas.**—The Stepney Borough Council recently instructed its standing committees to consider and report upon the practicability of substituting electricity for gas for lighting and heating purposes in the buildings under their control. The Works Committee reports that it has given instructions for the substitution of electric lighting for gas at three depôts, and that it is proceeding as rapidly as possible with the substitution of electricity for gas in street lighting. Other committees report that practically all their buildings are already electrically lighted. The General Purposes, Staff and Education Committee and the Public Health Committee do not consider that the replacement of gas by electricity for heating purposes can be justified.

(*Continued on page 944.*)

The s
Engin
inclus
choice
R. A.
Camde
and st
from t
ware
"toys
(popul
for be
work.
The
the je
and he
rifle r
pen in
of the
sories
supply
and el
way r
insepa
ductio
lamps,
goods,
and in
all tha
fies, w
a me
the d
Counc
Countr
to th
ment

needed
mated
counti
The s
Empir
acres,
the ar

# The Institution of Electrical Engineers.

## Summer Meeting at the South-Midland Centre.

THE summer meeting of the Institution of Electrical Engineers is being held this year from June 9th to 12th, inclusive, in Birmingham and district, an appropriate choice of locality since the city electrical engineer, Mr. R. A. Chattock, is the president-elect. Described by Camden in 1584 as "echoing with the noise of anvils," and styled in the 18th century "the toyshop of Europe," from the diversity of its small metal-ware products known locally as "toys," the great city of to-day (population, 944,000) is pre-eminent for both precious- and base-metal work.

The chief manufacturing centre of the jewellery trade, the birthplace and headquarters of British gun and rifle manufacture and of the steel pen industry, it is also a stronghold of the petrol motor vehicle and accessories trade, and a notable source of supply of much heavy engineering and electrical work, including railway rolling-stock. Birmingham is inseparably associated with the production of screws, locks, pins, lamps, silver and electroplated goods, art-metal ware, bicycles, brass and iron bedsteads, glassware, and all that the term "hardware" signifies, whilst mention may be made, as a measure of the commerce of the district, of the deputation representing the Birmingham City Council and other local authorities in the Black Country which recently submitted the suggestion to the Minister of Transport that the Government should contribute three-quarters of the money needed to carry out a proposed scheme, estimated to cost £10,000,000, of providing the Midland counties with a waterway outlet to the sea *via* Liverpool. The second city in England and the fourth in the Empire, Greater Birmingham has an area of 43,501 acres, whilst the I.E.E. South-Midland Centre comprises the area situated within a radius of 50 miles, omitting the Potteries and Crewe, which are included in the North-Western Centre's area. The Centre was formed in June, 1900, and the present gathering thus marks the completion of the first quarter of a century of its existence. Its membership is 941, and it includes the East-Midland Sub-Centre (which meets at Loughborough, Derby, and Nottingham), covering, besides the towns mentioned, also Coventry, Rugby, Stafford, and Wolverhampton, all of which are of importance by reason of their connection with the electrical industry.

Fig. 2.—Portion of Boiler House, Nechells.

The industrial achievements of the district are due in no less a degree to the coal and iron deposits of South Staffordshire than to the wise use of electricity within the South-West Midlands Electricity District, which is controlled by an advisory committee consisting of representatives of the two bodies which between them supply 98 per cent. of the electricity in the area. They are the Birmingham Corporation and the Shropshire, Worcestershire and Staffordshire Electric Power Co., whose capital stations at Nechells (municipal, running) and at Stourport on the River Severn (Power Co., to be inaugurated towards the end of the year), and the projected 300,000-kW Hams Hall station of the Birmingham Corporation, are being interlinked by means of 33,000-volt underground cables.

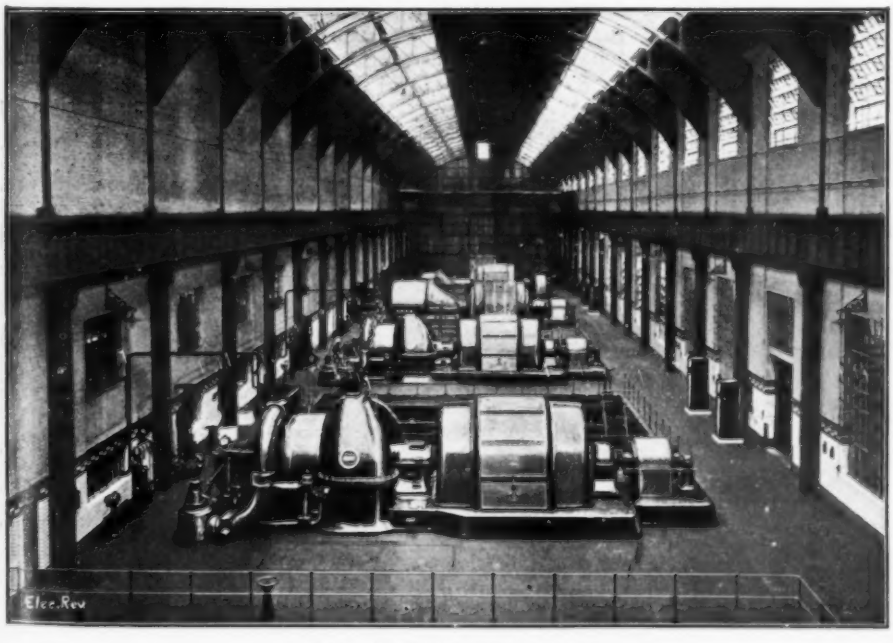



Fig. 1.—Turbine Room at Nechells.

Some 329 members and their ladies are participating in the meeting, the headquarters being located at the Grand Hotel, Birmingham, where the early contingents from the various centres forgathered on Monday evening.

On Tuesday morning the proceedings commenced with an early visit to the City of Birmingham electricity undertaking's power station at Nechells, which was opened by the Prince of Wales in June, 1923. Two B.T.-H. sets were in operation and a G.E.C. machine was being erected when we described the station,* and the accompanying illustrations indicate the additions that have been made to the plant since then. The general view of the turbine room (fig. 1) shows the first four 15,000-kW turbo-alternators installed (B.T.-H. sets in the foreground), while fig. 4 is a view of the Reyrolle switchgear control room; fig. 2 shows a portion of the boiler house, the six water-tube boilers on the right being fitted with closed ashpit stokers and those on the left with compartment stokers; fig. 3 shows the coal telphers and runways.

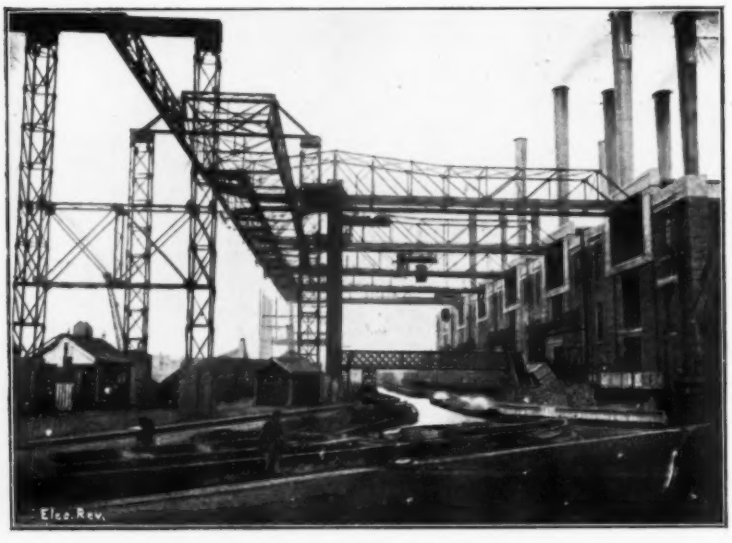



Fig. 3.—Coal Telphers and Runways, Nechells.

It will be recalled that the section of the station now in commission houses 60,000 kW of plant (73,500 kW overload), but ultimately there will be seven 15,000-kW sets with an aggregate overload capacity of 111,000 kW. The 22,500-kVA, 5,500-V, 3-phase, 25-cycle, 1,500-r.p.m. machines operate at a steam stop-valve pressure of 300 lb. per sq. in. with a temperature of 700 deg. F. and a vacuum of 28 in., sewage effluent, which is cooled in 35 (ultimately 45) towers, being used for condensing purposes. Each of the boilers, two of which are provided with air heaters in lieu of economisers, evaporates 35,000 lb. of water per hour, but for the final extension it is proposed to install four boilers capable of evaporating 150,000 lb. per hour when fired with pulverised fuel on the Lopulco system, with water screens and Foster radiant-type superheaters. Central pulverising plant is being installed in a separate building, containing four Raymond mills.

The annual accounts of the undertaking to March 31st, 1925, show a net surplus on the year's working of £89,370, and that the output increased by 13 per cent., the energy sold amounting to 193 million kWh. During the year 5,500 new consumers were added, making the total number 28,196, with a connected load of 193,376 kW, while 103,598 (60-watt) lamps and 19,233 h.p. in power supplies were added to the mains. Over 336,000 tons of fuel were consumed last year, and the maximum simultaneous demand last winter on all the generating stations reached 102,354 kW.

After the inspection the party was conveyed in charabancs to Witton, where luncheon was served at the Magnet Club, following which a tour was made of the works of the General Electric Co., Ltd., whose manifold activities we hope to outline in a later issue. The suburb of Witton has developed remarkably during the past 25 years, which have seen the growth of the group of factories covering a site of 120 acres and employing some 4,000 persons. With the aid of manufacturing resources at centres other than Witton, the G.E.C. is able to carry out the most comprehensive power and electrification schemes, using only plant and equipment manufactured within the company's own organisation. The modern ferro-concrete switchgear factory at Witton covers an area of 100,000 sq. ft., and the carbon works is the only one in the British Empire producing the searchlight carbons so essential to the fighting services, and it possesses a unique war record. The foundry is nearly two acres in extent, and is capable of producing all the iron castings the various works require, including turbo-alternator stators over 50 tons in weight. The principal individual works and departments comprising the Witton group of factories are 15 in number, and include a Development Department which tackles problems associated with manufacture. After tea in the Magnet Club, one of the finest social and athletic clubs provided by any industrial undertaking for its employés, the party returned to the city.

In the evening a reception was held at the Council House by the Lord Mayor of Birmingham, Ald. P. Bower, M.B.E., J.P., and the Lady Mayoress, supported by Mr. W. Lawson, M.I.E.E. (Birmingham Corporation meter and motor engineer), chairman of the I.E.E. South-Midland Centre, and Mrs. Lawson. The music and dancing were much appreciated, and the Art Gallery which was thrown open to the visitors, proved to be well worth a visit, and particularly representative of modern painters.

Fig. 4.—Switch Control Room, Nechells.

*ELEC. REV., May 25th and June 1st, 1923.

# The Incorporated Municipal Electrical Association.

## Annual Convention at Brighton.

NEXT week the 30th annual Convention of the Incorporated Municipal Electrical Association will be held at Brighton, commencing with a reception by the President, Mr. W. C. P. Tapper, and the Mayor of Stepney on Monday evening. It is no reflection upon the President's "home town" to say that it does not possess the accommodation required to cope with an influx of several hundred visitors and to provide them with entertainment when not engaged in their more serious duties; these facilities, on the other hand, are part of Brighton's stock-in-trade, and we have no doubt that the choice of that breezy watering-place will commend itself to the visitors, the majority of whom normally reside at inland towns. Perhaps, too, the fact that Mr. W. C. P. Tapper, who has served the Stepney Electricity Committee for over 26 years, commenced his professional career as a power station engineer at Brighton, under Mr. Arthur Wright, and was employed there for four years in the 'nineties, had something to do with the selection.

Under the circumstances, whilst the Mayor of Brighton will give the Convention a civic welcome, and will hold a reception on Tuesday evening, the programme is not so strong as usual on the social side, but provides more free time for the members to spend in accordance with their own inclinations—by no means a regrettable feature. In addition to Mr. Tapper's presidential address, papers will be read on street lighting, installation policy, and the question whether municipal undertakings are doing as much as they should to develop the demand for electricity; visits will be paid to the electricity undertakings at Brighton, Worthing, and Eastbourne, whilst the Brighton tramway department, the works of Messrs. Allen West & Co., Ltd., the electric railway on the sea front, and Mr. R. Borlase Matthews's electric farm (at East Grinstead) will be open for inspection. If, as we hope, the Convention is favoured with fine weather, a very enjoyable and not unduly strenuous week is in store for the members and their ladies.

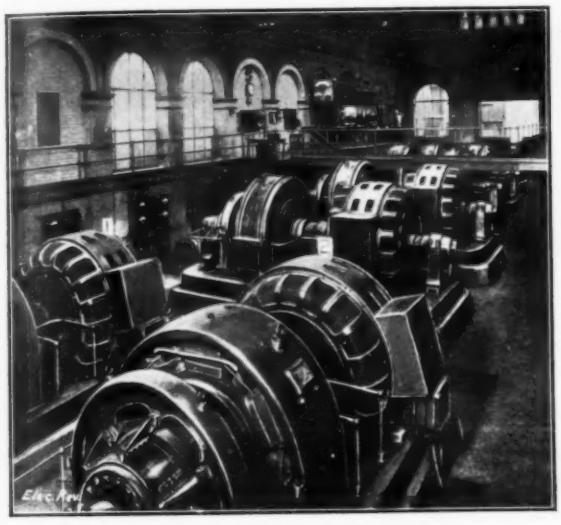
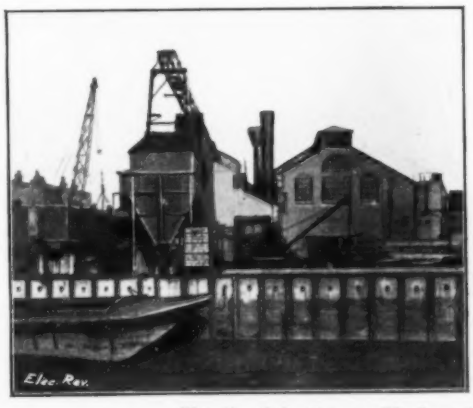


Fig. 1.—Stepney Electricity Supply: Osborn Street Sub-station.

### Electricity Supply in Stepney.

Whilst the annual Convention of the I.M.E.A. is always held, if it is feasible, at the home town of the President for the time being, there have been several instances in which, for one reason or another, it has not been possible to follow this custom. In the case of the Scarborough Convention a visit was paid to Mr. F. Ayton's undertaking at Ipswich, but when a similar excursion from Brighton to Stepney was discussed, it proved to be impracticable. Hence the President, upon whose shoulders so many burdens are imposed, though denied the pleasure of welcoming the Convention on his own ground, will at least be relieved of the duty of organ-



Figs. 2 and 3.—Stepney: Limehouse Power Station at Blyth's Wharf.
Fig. 3 shows the Harbour-master's House ("Our Mutual Friend," by Chas. Dickens.)

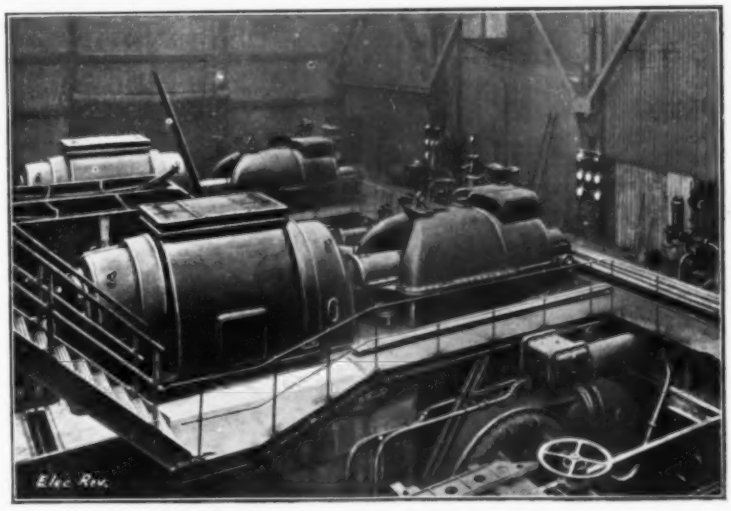


Fig. 4.—Stepney: Interior of Turbine Room.

ising a tour of inspection, in default of which we give herewith a brief account of Mr. Tapper's undertaking.

It was under the Board of Works for the Whitechapel district that the supply of electricity was inaugurated in that area, Mr. Arthur Wright being the consulting engineer; Mr. W. C. P. Tapper assisted him in preparing the plans and specifications, and was appointed resident electrical engineer to the Board. Whitechapel was absorbed in the new Metropolitan Borough of Stepney in 1900, and on Mr. Wright's retirement, Mr. Tapper became borough electrical engineer and manager, in which capacity he has carried out all subsequent extensions. The original power station in Osborn Street (fig. 1, p. 941) is now a sub-station, containing 8,000 kW of Bruce Peebles-La Cour motor-converters; the present station is situated on the bank of the River Thames, as shown in figs. 2 and 3, and was opened in 1909. Since that date various changes have taken place in the generating plant, as practice has improved and the demand for electricity has increased. The engine room (fig. 4) now contains three Metropolitan-Vickers turbo-alternators, each producing 10,000 kW at 6,600 V, 50 cycles, 3,000 r.p.m., and two Escher Wyss-Brown Boveri sets of 5,000 kW each, at 1,500 r.p.m. The original boiler house contains three Danks and ten Babcock & Wilcox boilers; a new boiler house, parallel with the former, is equipped with three Vickers-Spearing water-tube boilers rated at 50,000 lb. per hour, at 230 lb. per sq. in., with superheaters and economisers; each of these boilers forms an independent unit, with its own chimney and induced-draught fan. Troubles with the emission of grit are being dealt with experimentally by three types of grit catcher.

Coal is delivered in barges, picked up by crane, and transported by telpher to the bunkers; but an island wharf is being constructed in the river, which will enable ships to be unloaded directly. For circulating water, a cast-iron-lined tunnel, 5 ft. 6 in. in diameter, has been made from a well, 15 ft. diameter, in the river bed, to a well 20 ft. in diameter at the wharf side, the pump suction being taken from the latter. The return water is discharged through two 3-ft. pipes.

Ashes were originally removed by trolleys; the Bennis suction system is also in use, and in the new boiler house the water trough and drag chain type is being installed.

The whole of the switchgear throughout the undertaking is of Reyrolle's make, and motor-converters are installed in all the sub-stations. Merz-Price protection is used throughout for plant and feeders.

There are 9,519 consumers connected to the mains, and the output last year was 44,520,753 kWh sold, the maximum demand being 21,680 kW. The capital outlay amounts to approximately 1½ million pounds, and the total income last year was about £282,000, producing a surplus of approximately £55,000.

It is interesting to observe that Mr. Tapper's Limehouse power station is the only municipally-owned station included in the four which are regarded by the Electricity Commissioners as suitable for use under the London and Home Counties scheme "and for extension so as ultimately to form principal generating stations," the other three being Bankside, Barking, and Deptford.

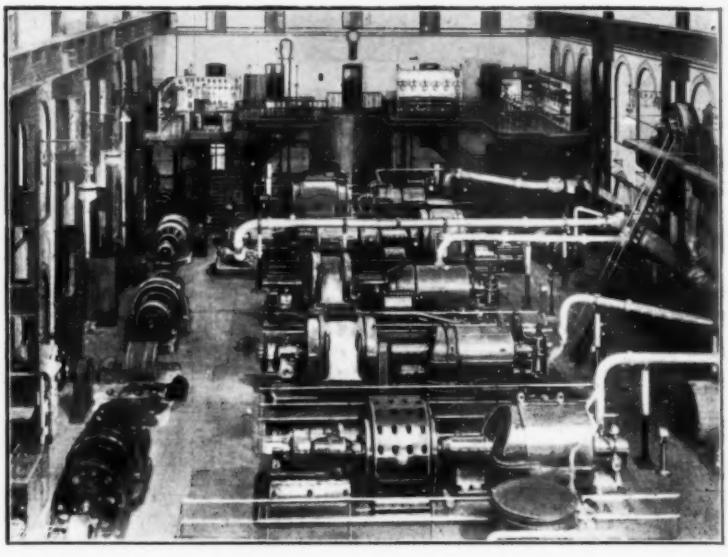


Fig. 6.—Brighton Electricity Supply: Interior of Turbine Room, Southwick Power Station.

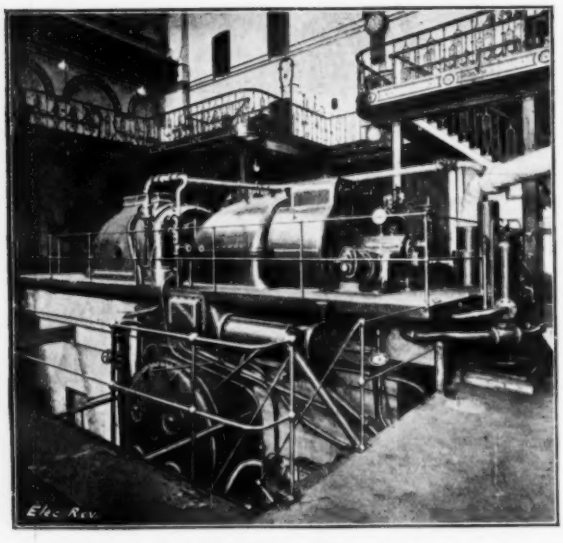


Fig. 5.—Brighton: The New M.V. Set.

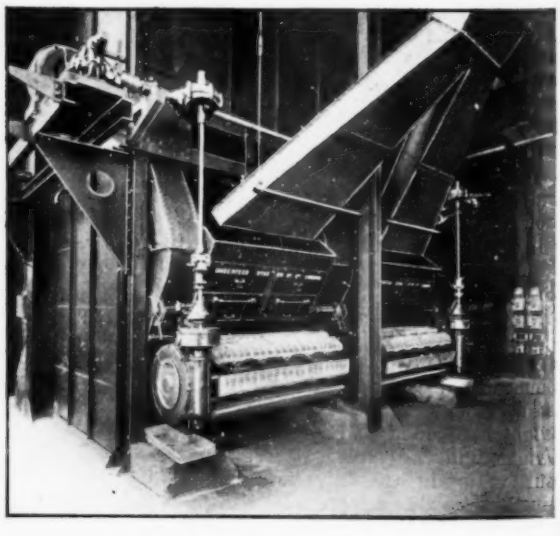


Fig. 7.—Brighton: Yarrow Boilers.

**Brighton, and its Electricity Department.**

The name of Brighton at once suggests an Aquarium; but this institution, ancient and honourable as it is, must not be regarded as the sole or even the main attraction of London's favourite seaside resort. Fresh air and a genial climate, under the shelter of the Downs, and the splendid sea-front, are perhaps its most precious possessions, which for nearly 150 years have ensured its pre-eminence and earned for it the patronage of

London society. Guided by wise counsel, the town has preserved its amenities and added to its attractions, taking the precaution to retain large open spaces in its vicinity and to restrain the too eager activities of the "jerry-builder." Its numerous hotels provide ample accommodation for large parties of visitors, and its Royal Pavilion affords facilities for them to congregate, with the result that Brighton is one of the most popular centres for the holding of conferences such as that of the I.M.E.A. Amongst other provisions for the visitor are many golf links, bowling greens, &c., and for wet weather indoor amusements are available in palatial buildings.

The Electricity Department, which commenced supply under Mr. Arthur Wright in 1891, is in the charge of Mr. John Christie, engineer and manager, and has enjoyed a long period of prosperity. The original electricity works in the North Road has been superseded by the present power station, which is situated at Southwick, Shoreham Harbour, and was set in operation in 1905; repeated replacements and extensions have kept the plant up to date and adequate for its purpose, the last addition being made in 1924, when a Metropolitan-Vickers turbo-alternator generating 6,000 kW at 8,000 V, 3,000 r.p.m., was installed (fig. 5). This brought the capacity of the station up to 19,000 kW. An illustrated account of the extensions appeared in the ELECTRICAL REVIEW of September 19th, 1924. Fig. 6 shows the interior of the turbine room. It is interesting to note that owing to the progressive increase in efficiency of the generating sets installed from time to time in place of older plant, the original nine Babcock boilers sufficed for the increased output until the installation of the new set above-mentioned necessitated the addition of two Yarrow marine-type boilers; one of these is oil-fired, the other being provided with an Underfeed Stoker Co.'s travelling grate and fed with preheated air. The Yarrow boilers are illustrated in fig. 7. Three of the Babcock boilers are also equipped for burning oil fuel, which is delivered into storage tanks of 1,000 tons capacity from oil tank steamers. Coal, of which 5,000 tons can be stored, is conveyed by suction plant (supplied by Messrs. H. J. H. King & Co., Ltd.) from the ships to the storeyard or direct to the bunkers.

The old North Road station now functions as the main sub-station for the centre of the town, and contains transformers of 12,000 kW capacity. Five 0.25 sq. in. feeders connect it with Southwick; they were made by Messrs. Siemens Bros. & Co., Ltd., over 20 years ago, and have never given any trouble—indeed, it is believed that they can be run at 24,000 V if it is necessary to increase their carrying capacity. Three smaller sub-stations are fed from North Road, and contain rotary converters for d.c. supply, but a new distribution network will be fed from them on the three-phase four-wire system. One of these, the Kemp Town sub-station, which will be visited by the I.M.E.A., is especially interesting, being automatic in operation, with remote control by pilot wires from the main sub-station. The plant comprises a Bruce Peebles-La Cour converter of 500 kW, Reyrolle a.c. switchgear, and Bertram Thomas d.c. switchgear. This installation is being duplicated. A high-pressure supply will be given from the sub-station to Rottingdean Village, 2½ miles to the eastward, and to a large sewage pumping plant at Portobello, 1½ miles farther on.

The public lighting, recently modernised, is carried out with gasfilled lamps run in series of five and ten off the lighting mains; in the King's Road Front 1,500-W lamps are used, and in less important roads 1,000- and 500-W lamps. This was the work of the Electric Street Lighting Apparatus Co.

There are 13,000 consumers, furnishing a revenue of £300,000; the output last year was 18 million kWh. More than half the capital has been written off, and over £75,000 has been contributed to the relief of the rates by the undertaking—results upon which Mr. Christie is to be congratulated.

### Exhibition of Electrical Apparatus.

In connection with the Convention, an electrical exhibition has been arranged on somewhat similar lines to those held at Scarborough and Chester. The exhibition is primarily a trade display, the main object being to give facilities to those attending the Convention for seeing the latest appliances, more particularly those in connection with domestic electrification. It will be held in the Corn Exchange.

Tuesday, June 16th, will be a "private day," when the exhibition will be open to members and visitors attending the Convention. During the afternoon lady visitors and members of the Women's Electrical Association will attend; arrangements will be made for light refreshments to be served. On Wednesday, Thursday and Friday, the exhibition will be open to members and visitors only from 10 a.m. until 2.30 p.m., after which until closing time it will be open to the public.

Screen announcements will be made at local places of entertainment, and an E.D.A. film will also be shown at the Regent Cinema during all performances on Thursday, Friday and Saturday, June 18th-20th, and probably at one performance on Wednesday evening.

The following are the names of the exhibitors and brief particulars of the exhibits:—

Bastian & Allen: Geysers, Quartzalite elements.
Belling & Co., Ltd.: Cookers &c.
Benham & Sons, Ltd.: Electro-vapour radiators.
British Electric Transformer Co., Ltd.: Sun-Ray radiators, cookers, fans, kettles, irons, and sterilisers.
British Thomson-Houston Co., Ltd., Falco & Hotpoint: Cookers, boiling rings and wash boilers.
Carron Company: Cookers.
Credenda Conduits, Ltd.: Cookers.
Economic Dryer Co.: "Eco-Dry" cabinet.
Electric Lamp Manufacturers' Association: A special display of modern lighting will be arranged at a dark end of the building.
General Electric Co., Ltd.: Cooker, wash boiler, Wembley street lighting lanterns, egg whisk, drink mixer, &c.
L. G. Hawkins & Co.: Cookers &c.
Jackson Electric Stove Co., Ltd.: Cookers, storage tank, boiler, kettles, fires, drying cabinet.
George Nobbs, Ltd.: Wash boilers, water heaters.
Metrovick Supplies, Ltd.: Cookers, fires, &c.
G. Wilkinson: Thermostat.

---

### Electricity in the Conversion of Mansions into Flats.

We learn that Mr. Herbert H. Berry, of Berry's Electric, Ltd., whose residence on the sea front, 10, King's Gardens, Hove, has recently been converted into flats, is extending a hearty welcome to any of the I.M.E.A. members and their wives who care to pay him a visit in his home. The flat is unique; it is one of the most beautiful in England, and faces private lawns and the sea. It demonstrates the part that electricity can play in overcoming the difficulties met with in the conversion of the large house or mansion into flats, adding to the comfort and luxury of the latter. It forms a part of two large adjacent houses, comprising 60 or 70 rooms, sufficient to accommodate five flats. The premises are centrally, low-pressure water-heated, and the temperature of Mr. Berry's flat is designed to be constant throughout, including the passages, &c., at 60 deg. F., electrical "Magicoal" fires being installed throughout to furnish the necessary "topping-up" temperatures, while the splendour of the old-fashioned chimney pieces is maintained. Electrically illuminated shaving mirrors or make-up glasses are fitted in all the bathrooms and bedrooms.

The reception rooms and corridors are provided with parquet floors, polished electrically and without fatigue. The usual electrical cooking equipment is installed in the spacious and lofty kitchen, and an original electrical service has been introduced in the form of provision for the washing of the china and glass. Mahogany Chippendale pilasters in the dining room are fitted with electrically-heated zinc-lined storage cupboards in the pedestals, providing a clean and warm storage for the dinner service, or entrée breakfast dishes for late risers, &c. An electric ruby light is provided with the cabinets as a warning against the waste of electrical energy. The rising heat from the inside of the pedestals is used to revolve a coloured diaphragm. This is used to illuminate cut-glass flower vases with all the colours of the spectrum, an electric lamp being provided under the diaphragm.

Additional comfort is added to the flat by controlling arrangements for the fires at entrance doors and in the bedrooms being installed at the bedside. Vacuum cleaners, electric irons, electric sewing machines, and all the usual electrical appliances are installed throughout the flat.

It is interesting to note that several pairs of adjoining mansions in King's Gardens, Brighton, have been converted into flats, and in some cases electric passenger lifts have been provided to serve the various floors.

---

**The Electric Farm.**—Among the visits arranged in connection with the Convention there has been included one to Mr. Borlase Matthews's farm at Greater Felcourt, East Grinstead, which will appeal to all members interested in the applications of electricity to agriculture. Possibly it may suit members to call on their way down to the Convention, in which case Mr. Matthews informs us that he will be pleased to see them on the 13th, 14th or 15th inst., or at any time during the Convention or on their return from it.

# Notes.

(*Continued from page 938.*)

**Fatality.**—While flying in an aeroplane and engaged in wireless tests, Flight-Sergt. Frank Lowry, R.A.F., was killed at the Andover Aerodrome, Hampshire, recently. Flying-Officer J. K. Smith pilot of the machine, said that they had been in the air about 15 minutes, when he noticed a smell and saw smoke coming out of the back cockpit. He throttled down the engine to speak to Lowry, but he had apparently collapsed to the bottom of the cockpit. He landed at once and Lowry was attended by a doctor.

Flying-Officer Cecil Nicholls, R.A.F., said that Lowry's death was due to shock, following the discharge of an electric current through his body.

The jury asked for an adjournment of the inquiry so that the wireless staff might complete the examination of the apparatus. According to *The Times*, at the resumed inquest Flight-Lieut. C. N. Ellen stated that on re-examining the machine he found four defects in the wireless apparatus used by the Sergeant—(1) a wrong-sized windmill had been fitted to the generator of the machine; (2) there was faulty insulation in the receiver ear pieces; (3) metal head pieces had been worn; (4) the accumulator supplying the l.p. current for the transmitter was "earthed." With all the faults together it would be possible for a current to pass through the operator and there was no evidence to show that the Sergeant was killed in any other way.

Squadron-Leader Charles Nutting, of the Signals Branch of the Air Ministry, said he had thoroughly examined the machine and it was quite evident that Lowry received the shock and the burns from the wireless set. If any of the faults mentioned by Mr. Ellen had occurred singly, no fatality would have resulted. The combination was most unusual; nothing like it had been known before. Much more than 1,000 volts were developed, but the voltmeter was burnt out and Sergeant Lowry probably did not know that he was developing such a high voltage; also, windmills were very similar in appearance, and the witness was not at all sure that the dead man had any information as to the exact type of windmill to use. The jury found that Sergeant Lowry lost his life through an electric shock while carrying out his duties.

**Electric Generators Driven by Natural Steam.**—Experiments carried out at the Geysers Canyon in the Sonoma County, America, have resulted in the utilisation of the natural steam from the geysers to drive a 35-kW turbine-generator. It was proposed to sink deep wells into the geysers to collect the steam, and, after encountering some explosions, an 8-in. iron pipe was sunk to a depth of 263 ft. A supply of superheated steam was collected by means of a 5-in. steam valve installed on the pipe. Fifty feet from this well a second was drilled to a depth of 318 ft. Well No. 1 supplied the power for drilling Well No. 2, the steam from which steam was applied to the 35-kW General Electric turbo-generator before the well was completed. A nearby hotel and several cottages were electrically illuminated by this machine. A project to further the work with a view to supplying electricity to Healdsburg, a town of 2,000 inhabitants, about 15 miles from the Geysers Canyon, is under consideration. It is said that the steam comes from a vast underground cavern, beneath which is a tremendous mass of molten lava. Water from surface lakes percolates through porous rock into the cavern, and is transformed into steam.

**Detecting Axle Cracks.**—A new method of detecting cracks in the axles of heavy transport vehicles was announced by Mr. Bruce, acting general manager of the London County Council Tramways, in a lecture recently. According to Press reports, the axle is magnetised, and a solution of iron and paraffin is poured on the places where minute hair-cracks, invisible to the naked eye, are likely to occur. The particles of iron cling to the cracks and reveal what would otherwise remain undetected. This discovery, Mr. Bruce said, is of the utmost value to transport concerns, and railway companies are now adopting it.

**Japan's Electrical Progress.**—The remarkable progress made by the Japanese electricity supply industry in the past few years is well illustrated by figures published recently by the *Electrical World*. These figures cover the period between 1907 and 1921. In the former year the installed generating capacity in the whole of the country was stated to be 74,400 kW; by the end of 1921 the total had risen to 1,527,000 kW, representing a twenty-fold increase in fourteen years. In this period hydro-electric power has outstripped steam-generated power for while in 1907 hydro-electric plants were only rated at 25,700 kW, in 1921 they had increased to 915,000 kW, leaving the steam stations at 612,000 kW. The principal reason for this is the high price which has to be paid for coal in Japan. Complete figures of the domestic installations are not available but it is shown that in 1920 there were about seven million electrically lighted houses—about two million fewer than in the United States. The average wattage, however, was much lower than in the United States, the figures being 75.5 W per house in Japan and 880 W in the United States.

An analysis of the size of the generating stations in Japan shows that by far the largest number were of a lower capacity than 50 kW—2,783 out of a total of 4,323 in 1921. There were only 97 stations of a greater capacity than 5,000 kW, and 46 of these were rated at more than 10,000 kW.

**Scottish Tramways Association Conference.**—We learn from the *Electric Railway and Tramway Journal* that the third annual conference of the Scottish Tramways Association was held in the Town Hall, Ayr, on May 29th and 30th, under the presidency of Councillor C. J. Morris Manco, Convener of the Edinburgh Corporation Tramways Committee. There was a very representative gathering of Scottish tramway managers present. Three papers of a practical character were read dealing with present-day problems. Police Judge J. Smith, Vice-Convener of the Ayr Tramways Committee, read a paper "Should Tramways be Rate-Aided." Mr. H. C. Babb, A.M.I.E.E., also read a paper, "Tramways *versus* Motor 'Buses." The third paper, "Public Control of Passenger Transport," was read by Councillor D. W. Beaton, Convener of the Aberdeen Corporation Tramways Committee. Mr. Archibald Robertson, general manager of the Greenock and Rothsay Tramway Companies, was elected chairman of the Association for the ensuing year.

**Rochdale Corporation Tramway Accident.**—The single-deck tramcar which played an unfortunate part in the accident which happened at Rochdale on April 6th, in which 23 people were injured was so badly damaged that a photograph of it in its damaged condition hardly conveys the impression of a tramcar at all. The car collided with a steam wagon and then ran backwards down a steep gradient, leaving the track and running into some shop fronts.

It is of interest to note that the general manager of the tramways states that of the lamps originally installed in the car, nearly 70 per cent. were still intact after the accident, and on test lighted up and are still in use. They were Siemens traction-type lamps.

**I.E.E. Summer Meeting.**—Our representative at the summer meeting of the Institution of Electrical Engineers telegraphs that throughout the first day the meeting was blessed with excellent weather. At the General Electric Co.'s Witton Works, a cooking, heating, and lighting demonstration was given for the special benefit of the ladies present, and was very much appreciated. All departments at the Witton works are very busy, and the visitors saw the new turbo-generators and switchgear which the G.E.C. is making for installation at the Nechells (Prince's) power station of the City of Birmingham Electricity Department. The splendid civic reception at the Council House by the Lord Mayor of Birmingham, Ald. P. Bower, M.B.E., J.P., was a great success. Dancing was continued till midnight. Sir Hugo Hirst, chairman of the G.E.C., who was in high spirits, was the recipient of many congratulations throughout the day on his recent baronetcy.

**French Electrification Schemes.**—According to *Electric Traction*, the French railways have extensive electrification schemes in hand. The programmes of the three railroads principally interested in electrification call for a total of about 9,000 kilometres of electrified line. The Midi Railway plans to have 3,200 kilometres electrified and the Compagnie d'Orleans and the Paris-Lyons-Mediterranean 3,400 and 2,400 kilometres, respectively.

**Pure Aluminium.**—According to *Science*, the development of a new refining process, described by Dr. Francis C. Frary before the American Electro-Chemical Society at Niagara Falls, has resulted in the production of aluminium of 99.983 per cent. purity in commercial quantities. Previously the highest purity aluminium ordinarily available was of 99.7 per cent. purity. The principal impurity is copper, but traces of iron and silicon are also present. Melted salts of sodium, aluminium, and barium fluoride are used in the refining process for the new product. The impure molten aluminium is carried by an electric current upwards through the molten layer of salts and is separated on top in a molten form, from which point it can be poured or ladled off into moulds. The pure aluminium has a beautiful silver colour and lustre which it retains very well. The bluish tinge characteristic of commercial aluminium, as found in the ordinary kitchen, is eliminated because of the low content of iron and silicon. The first of these impurities causes a greyish colour and the second a purplish colour; and either causes the metal to become dull and lustreless on comparatively short exposure.

**The Re-assembly of Parliament.**—Parliament re-assembled on Tuesday last, and on Thursday (yesterday) evening the House of Commons was to give further consideration to the North Metropolitan Electric Power Supply Co. Bill. Notice was given by a group of Labour members of a motion to refer the Bill back to the former Committee with an instruction to reconsider the clauses relating to the prices which the company may charge the public for electricity.

**A New Coal Cutter.**—Press reports state that at the American Mining Congress, which met at the end of May at Cincinnati, the prediction was made that the coal bill to the United States will be reduced in the near future very considerably by the perfection of new devices for mining coal. Mr. Edward J. O'Toole, general superintendent of the United States Coal and Coke Co. of West Virginia and Kentucky, stated that his company had just mined 115,000 tons by the new process, and added: "This machine makes the use of explosives in a mine unnecessary and reduces accidents. It undercuts coal by chewing into it with steel teeth. Then the coal automatically falls down upon a self-loader. We expect this machine to cut down the cost of mining by half."

**The Electrical Production of Steel.**—The technical conference of the Swedish Iron and Steel Association, which was held in Stockholm at the end of May, had under consideration a paper presented by Mr. Torsten Holmgren on the energy balance of the Swedish iron industry and its probable development. The author stated that the necessary conditions for the economic electrification of the iron industry at the present price of fuel were either to obtain energy at a lower price than 1 ore per kilowatt-hour, or to devise new methods which required a lower consumption of energy. The first condition was certainly complied with in various parts of Sweden. At the present time energy was sold for steam boiler operation at a price of less than 0.5 ore per kWh, and probably about 1,000,000,000 kWh per annum was available for this purpose. Since the cost of capital and labour demanded continuous working of most of the furnaces all the year round, while the surplus energy was not available day and night the question arose whether the electro-thermic furnaces, especially blast furnaces and open-hearth steel works, could be operated alternately or simultaneously with electrical energy and fuel. Should, for instance, three-fourths of the necessary energy be supplied electrically at 0.5 ore per kWh and the remainder with fuel, this would signify an economy of about 7,000,000 kr. per annum for the furnaces and the ironworks. The great problem for the Swedish engineers was to bring about such combined furnaces.

Mr. Holmgren proceeded to remark that the second condition, the invention of a method with a lower consumption of energy, pointed to the replacement of blast furnaces and open-hearth steel works by electric furnaces for the direct production of malleable iron or steel through the reduction of the ore by means of gas. Work on this problem was proceeding, and it would appear that the solution of the question in Sweden would occasion a similar transformation in other countries. In order to obtain a low price per kilowatt-hour in Sweden it was necessary to raise the period of utilisation as high as possible. Various measures were conceivable for this purpose, among others being the concentration of the iron industry in a few large works.

**A Large Electric Locomotive.**—The "world's most powerful" electric locomotive, 152 ft. long weighing 1,275,000 lb., and rated at 7,125 h.p., underwent its first running test at Pittsburgh, Pa., U.S.A., on May 14th. The engine is the first of twelve ordered from the Westinghouse Electric and Manufacturing Co. by the Virginia Railway. It was necessary to build it in three units so that the great length could successfully negotiate curves and otherwise be controlled efficiently; each power unit has the Mikado, or 2-8-2-wheel arrangement, and each driving motor has mounted at each end of the shaft a pinion which meshes with a flexible gear. The gears are mounted on a jack shaft, the power being transmitted from the gear centre to the driving wheels by means of side rods. The driving wheels are more than 5 ft. in diameter, and the cabs stand 16 ft. high and are over 11 ft. wide. Each engine unit has two driving motors, or six per locomotive and a gear ratio of 21 to 100 is maintained between the driving motor and driven wheels. It is estimated that the locomotive can haul a loaded train nearly two miles long. The control is of the electro-pneumatic type especially designed for use in electric locomotives.—*Reuter's Trade Service* (Pittsburgh).

**Large Met.-Vic. Colliery Winder.** — An order has been received by the Metropolitan-Vickers Electrical Co., Ltd., from the Carlton Main Colliery Co., Ltd., for an equalised Ward-Leonard pit winder equipment which is claimed to be (at the moment) the largest winding engine in the country, as the motors will be capable of exerting a maximum peak of 7,500 h.p. The set will operate under the following conditions:—Depth of shaft, 2,610 ft.; net load, 6.56 tons and output 300 tons per hour; a bi-cylindro-conical drum 16-25 ft. in diameter will be used with a rope speed of 67.5 ft. per second; each motor will be of 3,000 h.p. (r.m.s.), with a peak of 3,800 h.p. and a speed of 49.6 r.p.m. The generator capacity will be 2,130 kW; the weight of the flywheel 22 tons; size of the induction motor 1,540 h.p., and the speed of the flywheel set 750 r.p.m. Messrs. Markham & Co. will construct the mechanical parts of the equipment; the drum will be fitted with calliper-type brakes and the motors coupled directly to it, one on each side of the drum.

**Appointments Vacant.**—Mains assistant for the borough of Watford Electricity Department. Station superintendent, boiler-house superintendent, combustion engineer and chemist, four charge engineers, three senior switchboard attendants, and one constructional engineer for the North Wilford power station of the Nottingham Corporation. Foreman (£400) for the Government of Nigeria Posts and Telegraph Department. Assistant engineer (£450), for the City of York Electricity Department. Senior charge engineer and temporary assistant draughtsman, for Newport (Mon.) Corporation Electricity Department. Mains assistant for the Wolverhampton Corporation electricity department. Meter repairer and tester for the Aberdare U.D.C. electricity and tramways department. (See our advertisement pages to-day.)

**Electric Traction in Switzerland.**—Some interesting details have just been published dealing with traction on the Swiss Federal railways, and showing the gradual and most satisfactory extension of electricity in place of steam during the past year. Whereas in 1923 the locomotives of the C. F. F. covered a distance of 35,020,299 kilometres last year there was an increase of 12 per cent. to 39,269,741 km., thanks to the greater power of the electric tractors and their ever-increasing number. It is true that the coal used by the ordinary engines cost 85.5 centimes a km., while the electricity cost 115 centimes, but it must be taken into account that the majority of the electric tractors in 1924 were in use on the St. Gothard line, which has always been one of the most expensive to operate, and against the added expense of the electricity must be placed the unquestionable advantages of electric traction—greater speed and power. The electric tractors score especially in the latter respect, they draw many more ton-km. gross per engine km. than do the steam locomotives, and cost only 3 fr. 87 c. per 1,000 tons gross, against 4 fr. 20 c. spent per 1,000 tons by the latter.

The C. F. F. had 195 tractors in use in 1924, and another 62 engines and eight motor-coaches will probably be added this year. The average distance covered by goods trains in 1923 was 45,000 km. and by passenger trains 53,500, but thanks to the larger number of electric tractors employed in 1924, these figures were raised to 72,000 km. and 98,000 km. respectively. There is no doubt that electricity will become still cheaper in Switzerland, and that the power stations will be able to furnish it at lower prices as soon as an extension of traction allows the power stations to make better use of their resources. At present the power station of Ritom-Amsteg is yielding 60 per cent. of its possible output, and a kWh costs 6.73 centimes. The new power station of the Barberine, which has been working about 16 months, as yet only gives 5 per cent. of its output, with the result that its costs work out at 32 centimes per kWh.

**A Radio Ore Detector.**—In a recent issue of the Melbourne *Chemical Engineering and Mining Review*, Mr. F. H. Frazer described an apparatus by which, he claimed, hidden bodies of ore could be detected. The apparatus consists essentially of a short-wave radio transmitter with directional characteristics used in conjunction with corresponding receivers. Two methods of employing the equipment were outlined in the article. In the first, a "direct" method, the transmitter is placed at the bottom of a shaft. The receiver is then moved about in the vicinity of the mouth of the shaft, and the strength of the received signals at various points is noted. It is said that a considerable decrease in the strength, or a complete stoppage of signals, will be caused by hidden ore bodies. The position of the ore can be determined fairly accurately by means of a number of bearings. The second method described utilises the reflective property of the waves. "The transmitter beam is directed angularly downwards, the receiver being traversed along lines at right angles to the plane of the beam, and the antennæ of both instruments are swept angularly so that the receiver will be energised by the reflected ray if a lode is met by the transmitted beam." It is claimed that "wonderful results" have been obtained by this means. "Ore bodies were located from the surface at a depth of 590 ft. using the reflected beam, and by absorption from the interior a new lode was indicated."

**International Agreements with Regard to Electrical Transmission and Hydraulic Power.**—Last week two Conventions were published relating respectively to "The Transmission in Transit of Electric Power" (Treaty Series, No. 25 (1925); Cmd. 2420, H.M. Stationery Office, price 3d. net), and to "The Development of Hydraulic Power Affecting more than one State" (Treaty Series, No. 26 (1925); Cmd. 2421, price 3d. net). These Conventions were drawn up by a conference which met at Geneva last winter, at the invitation of the League of Nations, and were ratified by Great Britain, Northern Ireland, and New Zealand on April 1st, 1925.

The former provides that each contracting State undertakes to negotiate, on the request of any other contracting State, with a view to reaching agreements ensuring the transmission in transit of electric energy across its territory, the contracting State reserving the right to be excluded from the obligations if it can prove that the transmission in transit of electric energy across its territory would be seriously detrimental to its national economy or security. The agreements, among other things, may provide for the general conditions for the construction and upkeep of the lines, contributions for the State across whose territory the transmission in transit takes place, towards expenses, &c., the methods for exercising technical control and securing public safety, the means of telephonic or telegraphic communication, and the procedure for settling any disputes which may arise. The construction of lines, the transmission in transit, and the necessary installations are to be subject to the legal and administrative provisions of the State across the territory of which the transmission takes place.

The latter provides that, should reasonable development of hydraulic power involve international investigation, the contracting States concerned shall agree to such investigation, which shall be carried out conjointly at the request of any one of them, with a view to arriving at the solution most favourable to their interests as a whole, and to drawing up, if possible, a scheme of development, with due regard for any works already existing, under construction, or projected. The agreements contemplated may provide, amongst other things, for the general conditions for the establishment, upkeep and operation of the works, contributions by the States concerned towards the expenses, &c., the settlement of questions of financial co-operation, the methods for exercising technical control and securing public safety, the protection of sites, the regulation of the flow of water, the protection of the interests of third parties, and the method of settling any disputes which may arise.

# Institution Notes.

**Institution of Electrical Engineers.**—The Council has awarded Students' premiums, value £10 each, to the following:—Messrs. P. G. Ashley, B.Sc. (Hebburn-on-Tyne); D. I. Dawbarn (Monkseaton); E. Gallizia (Birmingham); J. H. Reyner (London); W. R. T. Skinner, B.Sc. (Leeds); G. E. Barrett, B.Sc. (Tech.) (Leeds); and A. Tustin, M.Sc. (Manchester).

**Association of Engineers (Argentina).**—According to the *Review of the River Plate*, the Association of British Engineers in the Argentine Republic and the Institution of Electrical Engineers opened their 1925 session in May with a joint visit to La Plata. At Messrs. Armour & Co.'s "Frigorifico" the party was guided through the many sections of the plant. Great interest was taken in the boiler house with its oil fuel and Babcock & Wilcox boilers, the horizontal Corliss engines and vertical compressors, and the sub-station where the electricity supply taken from the River Plate Electricity Supply Co. is controlled. Across the road in the power house of the River Plate Electricity Supply Co. the manager, Mr. L. W. Migotti, showed the party two different systems of burning oil and also a new Parsons turbine on load. After an inspection of the auxiliary plant, the switchboard arrangements, and the intake for the circulating water, there was barely time to do justice to Mr. Migotti's hospitality before returning to Buenos Aires.

**Royal Institution.**—The Benzene Centenary will be celebrated by an extra Friday evening discourse on June 12th, which will be delivered by Sir William Pope on "Faraday as a Chemist," and on Tuesday, June 16th, the anniversary of the discovery, by a reception of delegates at 11 a.m. by the president, the Duke of Northumberland, when diplomas of Honorary Membership will be presented and short addresses delivered. A banquet will be held in the evening in the hall of the Goldsmiths' Company.

# Our Personal Column.

***The Editors invite electrical men, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the* ELECTRICAL REVIEW *posted as to their movements.***

MR. A. E. DYMENT, formerly president of the Canadian General Electric Co., has been elected chairman of the board of directors of that company. Mr. D. C. DURLAND has been appointed president, and Mr. J. H. BLACK (Toronto) has been elected to the board to fill the vacancy caused by the death of Sir William Price.

SIR WILLIAM BRAGG has been elected president of the Institute of Physics in succession to Sir Charles Parsons.

As the King's Birthday Honours List appeared at the moment of closing our pages last week, we were only able to make the briefest mention of the distinctions which had been conferred upon electrical men. The outstanding honour, from the standpoint of the electrical industry, was the baronetcy awarded to Mr. HUGO HIRST, the chairman and managing director of the General Electric Co., Ltd. Sir Hugo Hirst, Bart., as he will now be known, is probably one of the best-known personalities in the electrical industry both by reason of the largeness and variety of the interests of the G.E.C. and its associated and subsidiary companies, and by reason of his lengthy connection with electrical affairs. It was as far back as the year 1886—thirty-nine years ago—that Sir Hugo, together with the late Mr. G. Byng, laid the foundations of the business which now has such large productive activity here and such wide-spreading commercial and constructive interests in practically every overseas market. That business naturally began in a very small way, and like the industry itself, it has grown stage by stage until to-day it has become a vast edifice for industrial production in contrast with the modest place in which it was born and from which it factored the products of other manufacturers. The growth of the General Electric business, the starting up of its different factories and their continual expansion, the purchase of other concerns, the opening of branches in the Dominions and elsewhere overseas, the formation of subsidiary companies, the progress from the production of the smaller electrical manufactures to the building of large machinery and plant, the signal service rendered to the country by the maintenance of its carbon factory, the development of the manufacture of electric lamps and cables—these and manifold other features of the business have been carried through with Mr. (now Sir) Hugo Hirst at the helm with an army, ever growing, of experts in the technics of electrical engineering and in the commercial and financial operations which required consistent guidance and control in order that the big business might be soundly based and wisely developed. It hardly requires to be told in these pages how real has been the influence of the personality of Sir Hugo upon the character and the development of the concern with which his name is inseparably connected and which to-day gives employment to over 20,000 workpeople. Sir Hugo Hirst has frequently been enabled to assist the present and preceding Governments by reason of his knowledge of the electrical industry in this country, his close acquaintance with Continental industry, and his position as a member of the Advisory Council of the Board of Trade. The G.E.C. spreads its influence into every branch of the electrical industry, and in the honour that has been given to its chairman and managing director the company has been singled out for a high distinction.

In addition to the names already mentioned as appearing in the King's Birthday Honours List, we note that of Mr. W. G. VERDON SMITH, managing director of the Bristol Tramways and Carriage Co., Ltd., who is made a C.B.E., and that of Alderman JOHN W. FORREST, O.B.E., a member of the Blackburn Corporation Tramways Committee, who has received the honour of knighthood.

MR. HERBERT EDWIN BLAIN, whom we shall know as Sir Herbert in future by virtue of his inclusion in the list of Birthday Honours, first became well known at the centre of things electrical when he left the position of traffic assistant to the Liverpool Corporation and came to London as

*Elliott & Fry]* [*London.*

**Sir H. E. Blain.**

manager of the West Ham Corporation Tramways in the year 1903. Since then there have been few better-known men in the traction world of the metropolis and none more highly esteemed. After a very successful period of ten years at West Ham he joined the Underground Railways and the L.G.O.C. group as purchasing agent. Later he became operating manager and subsequently assistant managing director. His active service for the good of the community in the "Safety First" movement, his presidency of the Municipal Tramways Association, his practical interest in the Industrial League and Council, and other like matters are all part of a career which destined him to be the organising genius for the Conservative and Unionist Party where, as its principal agent, he rendered invaluable service which is now fittingly recognised by the awarding of the honour of knighthood.

PROF. MICHAEL I. PUPIN, of Columbia University, New York City, has been elected president of the American Institute of Electrical Engineers.

MR. D. LANDALE FREW, of Glasgow, has been appointed president of the West of Scotland branch of the Association of Mining Electrical Engineers.

The *Indian Textile Journal* for April states that Mr. P. PADMANABAM NAIDU, son of Mr. P. VENKATRAJULU NAIDU, personal assistant to the manager of the Madras Electric Tramways, Ltd., left Madras recently for Colombo, *en route* to America, to study with the object of specialising in auto-electrical engineering.

A South African contemporary reports that Mr. ALEX. COLLEDGE, of Messrs. Hick, Hargreaves & Co., Ltd., Bolton, engineers, recently arrived in South Africa in the course of a world tour on behalf of the company.

SIR PHILIP NASH has been on a visit to the States studying electrical developments and, according to the *Electrical World*, he was leaving New York for home on June 9th. The same contemporary also reports the departure for Europe (to consult with wireless interests) of Mr. DAVID SARNOFF, vice-president of the Radio Corporation of America. GENERAL HARBORD, the president of the Corporation, left for abroad for the same purpose several weeks earlier.

MR. WILLIAM L. ABBOTT, chief operating engineer of the Commonwealth Edison Co., Chicago, has been nominated for the presidency of the American Society of Mechanical Engineers.

MR. R. H. WATSON, A.M.I.E.E., Irish manager for Messrs. Drake & Gorham, Ltd., was presented with a smoker's cabinet and case of pipes by the branch managers of the electrical wholesale firms and factors in Belfast on the occasion of his leaving to take up a responsible position at the head office. Mr. F. B. Palmer (Metropolitan-Vickers) acted as chairman. Mr. W. R. E. Boyd (G.E. Co.) made the presentation and he was supported by Mr. Haldane (British Thomson-Houston Co.) and Mr. Evans (Edison Swan Electric Co.). Mr. Watson, in acknowledging the gifts, commented on the friendly feeling which existed amongst the various branches of the electrical wholesale trade in Belfast.

The honorary degree of Doctor of Engineering was conferred upon SIR DUGALD CLERK at a congregation of the University of Liverpool last week.

The *Australian Electrical Times* records the travels abroad of a number of electrical men. Mr. S. P. JONES, assistant chief engineer of signals and telegraphs, Victorian Railways, who was selected by the Railway Commissioners to visit the United States in order to investigate railway matters, was given a send-off prior to leaving Melbourne to join the s.s. *Niagara* at Sydney. Mr. C. E. CROCKER, general manager of Perth City Council Electricity and Gas Department, has been on tour in America. Mr. J. B. JACOBSEN, managing director of Messrs. McKenzie & Holland (Australia) Pty., Ltd., railway signalling engineers, &c., has returned from a visit to Great Britain and the U.S.A. Mr. F. W. WHEADON, general manager of the Adelaide Electric Supply Co., Ltd., left in April to visit America and Europe. He will represent Australia at the World Power Conference at Paris in June and will subsequently visit England, Sweden, Denmark, and Germany. Our contemporary also records that Mr. T. M. CAREY, electrical engineer to Perth City Council, has resigned to become the Adelaide manager of the Hume Pipe Co.

MR. THOMAS FENDER, a special director of Messrs. Vickers, Ltd., has retired, on medical advice, from the active service of the company. In 1901 he left the Elswick works of Sir W. G. Armstrong, Whitworth & Co., Ltd., and joined the staff of Messrs. Vickers at Barrow-in-Furness with the object of introducing the premium bonus system of payment by results, an achievement which he successfully accomplished. In 1910 he was appointed works superintendent at Barrow, and in 1919 he was made a special director of the company, a position which he will retain for a further period of two years.

PROFESSOR JOCELYN F. THORPE, C.B.E., D.Sc., F.R.S., has been appointed an additional member of the Explosives in Mines Research Committee.

The *Electrical World* records that on May 16th the members of the Edison Pioneers and many others connected with the electrical industry of the United States journeyed to Menlo Park, N.J., where, from 1876 to 1882, Thomas A. Edison had his shops and where he invented the incandescent lamp. The occasion was the unveiling of a bronze tablet indicating that on that site Edison "began his work of service for the world to illumine the path of progress and lighten labour for mankind."

A marriage has been arranged, and will shortly take place, between Mr. FRANK A. NEWINGTON (late of Edinburgh), of "Bircholme," Hawkhurst, Kent, and JANIE, daughter of the late Dr. and Mrs. Ross Watt, of Amisfield, Ayr.

MR. G. WILKINSON, Corporation electrical engineer Harrogate, has offered to present equipment to the Harrogate Technical School towards the founding of an engineering shop for young students.

MR. J. M. KEENAN, of Margate, has been appointed lighting mains superintendent by Tunbridge Wells Town Council at £367 15s. per annum.

The Leek Urban Council has increased the salary of the electrical engineer, Mr. A. H. TULLOCK, by £50 per annum.

MR. G. G. BELL, late engineer and manager at Hammersmith electricity works, was recently presented by the staff and employés of the department with a pair of silver entrée dishes. Mr. F. Hill, the present chief, made the presentation, and in a short speech expressed the sentiments of the many subscribers, and their sincere wishes for a speedy return to complete health.

MR. R. L. ACLAND, M.I.E.E., has recently resigned from the staff of Sir W. G. Armstrong, Whitworth & Co., Ltd., to take up a position as outside technical representative with the London Electric Wire Company and Smiths, Ltd. Prior to joining Armstrong, Whitworth & Co., Mr. Acland was engineer and manager of the Chesterfield Corporation tramways.

MR. W. BENNETT has severed his connection as Midlands representative for Messrs. J. H. Tucker & Co., Ltd., and has joined the Birmingham staff of the General Electric Co., Ltd.

**Obituary.**—MR. H. J. COATES.—We regret to learn that Mr. H. J. Coates, A.M.I.E.E., died on May 9th at his residence at Stoke, Coventry. He had had over forty years' service with the organisation of the General Electric Co., Ltd. Through the invention of an electric gas lighter and other patents he was brought into touch with the late Mr. G. Byng, of the G.E.C., and his business was taken over by the company and a works was established in Chapel Street, Salford, where, as chief electrician and works manager, he did much work in the design and patenting of bells, telephones, electric light fittings, X-ray apparatus, &c. Mr. Coates was associated with the late Dr. Reckenzaun in the development of clockwork meters. The Nernst lamp and magneto ignition matters also occupied his attention. At Coventry he concentrated on patent matters for the Peel-Conner Telephone Works; he is described as the "Grand Old Man" of the Peel-Conner Company. He was a member of the Northern Society of Electrical Engineers from its inception right down to the date of its incorporation in the I.E.E. At the end of last year Mr. Coates went to Madeira for the benefit of his health, but unfortunately the improvement gained did not last long after his return to England, and he passed away after a month's illness.

MR. GORDON SAIES.—The death was announced recently of Mr. Gordon Saies, secretary of the Midland Electric Corporation for Power Distribution, Ltd. Mr. Saies was appointed secretary of that corporation in 1900, and retained the position to the date of his death. He was also secretary of the Electric Supply Co. of Victoria, Ltd. The funeral at Selly Oak Cemetery, Birmingham, was attended by Mr. James Taylor, chairman of the corporation, Mr. Carlton Stitt, director, Electric Supply Co. of Victoria, Ltd.; Mr. W. Kerfoot, British Insulated and Helsby Cables, Ltd., Prescot; Mr. G. R. J. Parkinson, chief engineer of the Midland Electric Corporation, and a number of members of the engineering and office staffs of the company.

MR. O. HEYWOOD.—The death is announced of Mr. Oliver Heywood, of Mellor, partner in the firm of Dorning & Harrison, electrical engineers.

Mr. E. F. SPURRELL.—We regret to record that Mr. E. F. Spurrell, borough engineer to the Metropolitan Borough Council of Holborn, passed away suddenly on June 3rd. The newly-formed Institution of Public Lighting Engineers owes its inception to Mr. Spurrell, for, seeing the need for such an organisation, he called a number of interested gentlemen together in 1923, and in September of that year the Institution was launched at Birmingham. He was intending to represent the Holborn Council at the forthcoming conference of the Institution in Leeds.

MR. E. G. P. KIRBY.—*The Times* "Deaths" column records the death on May 29th, at Shaldon, Devon, of Mr. Ernest George Patrick Kirby, retired superintendent, Western Telegraph Co., third son of the late Lieut. J. Kirby, aged 43.

MR. JOHN YOUNG.—The death of Mr. John Young takes from amongst us one who was prominent in the very early days of the electric tramway, Glasgow being then the centre of his activities. He had been in the service of the Glasgow Corporation for some seventeen years in another capacity (in connection with the Cleansing Department) when the Corporation decided to establish a Tramways Department. Mr. Young was appointed general manager of that department, and in 1894 municipal tramways were brought into operation. Later he advised the change-over from horse traction to the electric overhead trolley system, and many readers are familiar with the history of the growth of the undertaking and the high repute in which it is held by tramway authorities in different parts of the world. Mr. Young was one of the founders of the Municipal Tramways Association and was its first president, in the year 1902. His reputation in the electric traction world brought him outside demands for his expert knowledge and assistance, but it was not until 1904 that he was induced by the late Mr. C. T. Yerkes, then chairman of the Underground Electric Railways Company of London, to come to London and take up a post as his general assistant and as general manager of the Metropolitan District Railway. The electrification of the latter line and some of the associated tube railways followed, and when Mr. Yerkes died Mr. Young retired from the general managership of the District and became a director. He also joined the boards of the Lancashire Electric Power Co. and the Paisley District Tramways Co., but some 15 years ago he retired from nearly all his business interests and went to live on an estate that he purchased in Wiltshire. He was in his eightieth year.

**Will.**—MR. C. T. WILLIAMS, late of the Indian Telegraphs, left £2,369 gross and £2,148 net personalty.

## New Companies Registered.

**Dubilier Condenser Co. (1925), Ltd.** (206,384).—Registered as a "public" company on June 3rd, with a nominal capital of £300,000 in 250,000 7½ per cent. cumulative preference shares of £1 each and 500,000 ordinary shares of 10s. each. The objects are:—To acquire all or part of the business of electricians and manufacturers of electrical condensers and electrical apparatus of all kinds carried on by the Dubilier Condenser Co., Ltd., at the Ducon Works, Victoria Road, Acton, W.3, and elsewhere, and all or some of the assets of the said company (including particularly the trade mark or name "Dubilier," together with the goodwill of the business in connection therewith), and all or part of the liabilities of the above company; to adopt an agreement with the Radio Company of Great Britain, Ltd.; to carry on the said business and that of mechanical engineers, manufacturers of generators and accumulators, radio and high-pressure protective apparatus, suppliers and distributors of electricity and electrical and other energy for lighting, heating, telegraphic, telephonic and radio communication, proprietors and managers of telephone or telegraph works, lines, systems, stations and exchanges, receivers, transmitters, carriers and distributors of news, intelligence and messages of all kinds, &c. Minimum cash subscription, 7 shares. The first directors are:—W. H. Goodman, 94, Addison Road, Kensington, W.14, engineer, managing director; T. A. Evans, 1, Down Street, Mayfair, W.1, retired coal merchant; J. E. Hyde, St. Andrews, Woodside Avenue, North Finchley, N.12, shipbroker; A. Mikellatos, "Bevendean," Oxshott, Surrey, retired coal merchant. Qualification, £500. Remuneration, £250 each per annum (chairman, £350), and a percentage of the profits. Solicitors: Herbert Smith, Goss, King and Gregory, 62, London Wall, E.C.2. The registered office is at Ducon Works, Victoria Road, Acton, W.3.

**St. Andrew Electric and Radio Co., Ltd.** (206,328).—Private company. Registered May 29th. Capital, £350 in £1 shares. Objects:—To carry on business as indicated by the title. The first directors are:—J. E. Cashnella, 66, Wallingford Avenue, North Kensington, W.11; S. L. Roberts, "Holmleigh," Sherbourne, Dorset. Solicitor: John J. McIntyre, 401-3, Bank Chambers, 329, High Holborn, W.C.1. Registered office: 28a, Little St. Andrew Street, St. Martin's Lane, W.C.2.

**R. Alger & Sons, Ltd.** (206,441).—Private company. Registered June 4th. Capital, £20,000 in £1 shares (5,000 6 per cent. cumulative preference and 15,000 ordinary). Objects:—To acquire the business of electrical, heating and sanitary engineers now carried on by F. J. Alger and T. E. Alger at Dock Street, Newport, Mon. The permanent directors are:—F. J. Alger, 29, Llanthewy Road, Newport; T. E. Alger, A.M.I.E.E. (managing director), 50, Oakfield Road, Newport; Mary A. I. Alger, address not stated. Qualification, £100 shares.

**Radiovim, Ltd.** (206,395).—Private company. Registered June 3rd. Capital, £1,500 in £1 shares. To carry on the business of electricians, electrical contractors, electrical, mechanical and general engineers and founders in brass, iron or any other metal or alloy, &c. The subscribers (each with one share) are:—H. Drinkwater, 55, Allington Street, Liverpool, engineer; A. J. Hodgson, 35, Ampthill Road, Liverpool, engineer. The first directors are to be appointed at the first ordinary general meeting. Qualification, 1 share. Secretary: A. J. Hodgson. Solicitor: F. W. Jackson, 57, Moorfields, Liverpool.

**S. A. Cutters, Ltd.** (206,327).—Private company. Registered May 29th. Capital, £3,000 in £1 shares (1,000 7 per cent. cumulative preference and 2,000 ordinary). Objects:—To acquire the business of electrical and mechanical engineers, manufacturers and agents, carried on by E. H. W. Partridge and J. P. de Hailes at 15, Red Lion Square, E.C., as "S. A. Cutters," and to carry on the same and the business of wireless and electrical manufacturers, repairers, engineers and contractors, tool and motor accessory manufacturers, &c. The subscribers (each with one share) are:—E. H. W. Partridge, 61, Lee Park, Blackheath, S.E.3, engineer; J. P. de Hailes, 61, Lee Park, Blackheath, S.E.3, engineer. E. H. W. Partridge signs as director. Solicitors: Stokes and Stokes, 32, Bishopsgate, E.C.2.

**Shades, Ltd.** (206,329).—Private company. Registered May 29th. Capital, £200 in £1 shares. Objects:—To carry on the business of designers, manufacturers, importers and exporters of and dealers in shades of all kinds for use in connection with gas, oil or other form of lighting, and to carry on the business of electrical engineers, dealers in electric light and electrical apparatus, &c. The permanent directors are:—H. Z. Rycroft, 13, Stanley Crescent, W.11; Dorothy S. Rycroft, 13, Stanley Crescent, W.11. Remuneration as fixed by the company. Registered office: 111, Oxford Street, W.1.

**Coughlan & Tyrrell, Ltd.** (206,191).—Private company. Registered May 25th. Capital, £3,500 in £1 shares. Objects: To adopt an agreement with W. P. Coughlan and A. H. F. Tyrrell, and to carry on the business of manufacturers, distributors and buyers of and dealers in wireless sets, makers of valves, amplifiers, earphones, loud speakers and wireless accessories and parts, batteries and accumulators, drawn wire, electric cable and lamps, and all articles made from tungsten, molybdenum and other metal, manufacturers of and dealers in fountain pens, buttons and fancy goods of all kinds made from metal, wood, ivory, ebony, ebonite, erinoid, &c. The directors are:—W. P. Coughlan, 75, Granville Buildings, Luke Street, E.C.2, ebonite turner and machinist; A. H. F. Tyrrell, 58, Mount Pleasant Road, Tottenham, N.15, ebonite turner and machinist; F. W. Lowenadler (managing director and permanent chairman) and P. C. Michell, addresses not stated. Qualification, £1. Solicitors: Kimber, Bull, Howland, Clappe & Co., 6, Old Jewry, E.C. Registered office: 14, New North Street, Holborn, W.C.1.

**Kinetic Elutriators, Ltd.** (206,274).—Private company. Registered May 28th. Capital, £500 in 1s. shares. Objects:—To acquire from L. Andrews, of 104, Victoria Street, S.W., an invention relating to a process of clarifying particles by elutriation, to carry on the business of designers, makers, vendors and erectors of and dealers in milling, grinding and clarifying machinery, engines and processes of all kinds, mechanical and industrial manufacturers and engineers, welders, metallurgists, electrical and hydraulic engineers, &c. The subscribers (each with one share) are:—F. E. Stafford, 40, Chevening Road, N.W.6, solicitor's clerk; E. Young, 48, Highfield Avenue, Golders Green, N.W.11, cashier. The first directors are:—L. Andrews, J. R. Dick, B.Sc., and J. C. Farrant, M.A.I.M.E. Secretary (*pro tem.*): S. W. Cox. Solicitors: Richardson, Sadler & Collard, 3, St. James Street, S.W.1.

**Rolls British Sales, Ltd.** (206,216).—Private company. Registered May 25th. Capital, £500 in £1 shares. Objects: To carry on a mail order business for the sale and supply of all articles dealt in by the company; to manufacture and deal in electric lamps and globes, and wires, fittings, shades, and other accessories used for installing electric light, &c. The subscribers (each with one share) are:—A. W. Kimber, Chevening, The Drive, Wembley Park, engineer; F. Tompkins, 29a, High Street, St. John's Wood, N.W.8, secretary. The permanent directors are: A. W. Kimber and P. Howard. No qualification required.

**Wavenette Co., Ltd.** (206,235).—Private company. Registered May 26th. Capital, £30 in £1 shares. Objects: To carry on the business of agents for the buying and selling of and dealers in instruments, fittings and materials used in connection with radio-telegraphy, &c. The directors are:—J. Matthews, 395, Pinner Road, Harrow-on-the-Hill, Middlesex, manufacturers' agent; H. A. Ardley, 122, Onslow Gardens, Wallington, Surrey, assurance official; L. Sgal, Oak Lodge, Bedford Avenue, Barnet, Herts., importer. Secretary: J. Matthews. Registered office: 12, Paternoster Row, E.C.4.

**Schall & Son, Ltd.** (206,458).—Private company. Registered June 5th. Capital, £20,000 in £1 shares (5,000 6 per cent. cumulative preference and 15,000 ordinary). To acquire the business of an electrical engineer carried on by W. E. Schall at 71 and 75, New Cavendish Street W., as Schall & Son, and to carry on the same and the business of manufacturers of, and dealers in electrical, medical, surgical, dental, and scientific apparatus, appliances, and instruments. The subscribers (each with one ordinary share) are:—W. E. Schall, 75, New Cavendish Street, W.1, electrical engineer; and R. J. Woodrow, 5, Weldon Crescent, Harrow, clerk. W. E. Schall is permanent governing director with £1,000 per annum as remuneration. Qualification, £100. Solicitors: Bailey, Shaw & Gillett, 5, Berners Street, W.1. Registered office: 75, New Cavendish Street, W.1.

**Wireless Generators, Ltd.** (206,467).—Private company. Registered June 5th. Capital, £5,000 in £1 shares. Objects: To acquire a licence of the British rights in the Brooks Savers' patents in so far as they affect or are applicable to radio or allied purposes, such as receiving and transmitting sets, telephones, telegraphs, and signals, and to carry on the business of engineers, patentees, and exploiters of patents relating to radio apparatus, &c. The subscribers are:—Capt. F. V. Spooner, The Polo Farm, Wokingham, Berks.; and J. B. Brown, 193, Mitcham Lane, S.W.16, secretary. The subscribers are to appoint the first directors. Secretary: J. B. Brown, 193, Mitcham Lane, S.W.16.

## Official Returns of Electrical Companies.

**W. S. Jeal and Ebury Engineering Co., Ltd.**—A. E. Tilley, of 8 Staple Inn, Holborn, E.C., was appointed receiver on May 25th, 1925, under powers contained in debenture dated August 6th, 1919.

**L. J. Chambers & Co., Ltd.**—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated May 20th, 1925, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

**Edison Accumulators, Ltd.**—Satisfaction in full on May 22nd, 1925, of debenture dated March 11th, 1921, securing £60,000.

**Veritys, Ltd.**—Second debenture dated May 15th, 1925, to secure £60,000 charged on the company's undertaking and property, present and future, including uncalled capital. Holders: W. C. Fletcher, 161, Aston Road, Birmingham; and J. Coleman, 71-3, Edmund Street, Birmingham.

## City Notes.

**Shanghai Electric Construction Co., Ltd.**

The annual meeting was held in London on June 3rd, Mr. J. S. Haskell presiding. In presenting the report and accounts (which were reviewed in our last issue, p. 909), the chairman said that the increase in the operating profit was by no means commensurate with the growth of the traffic revenue. The increase in the tariffs had reduced the number of passengers, although the revenue was higher. The periodical increasing of the tariffs was the only way of combating the continued depreciation of the subsidiary coinage. So far as they could judge, the effect of the latest increase was distinctly beneficial. It had been necessary to proceed with the renewal of the track more rapidly than was anticipated, and the cost of this had been increased by the adoption of a more satisfactory track foundation than the original one. Under the new railless traction concession the company was to pay 2 cents per car-mile for the use of the roads; formerly it had to contribute half of the cost of reconstructing the roads. As mentioned in the report, negotiations were proceeding for the settlement of an extra claim for taxes. Although the vehicles under construction would increase the total by more than 50 per cent. this was by no means the ultimate limit of development. If the results from railless traffic came up to expectations, further trolley omnibuses would be required. The car-shed accommodation was being extended and the preparation of the bodies for the new vehicles was in active progress at the Baikal Road shops. It was intended to manufacture the Singapore trolley 'bus bodies in these shops at a reasonable profit. The capital issue made during the year was not intended to provide in full for the complete development of railless traction. This work and the renewal of the tramway track would call for additional funds. In conclusion, the chairman referred to the rehabilitation of the Singapore undertaking, which had been made to yield profits after a long period of stagnation.

**Madras Electric Supply Corporation, Ltd.**

Mr. James Gray (chairman) presided at the annual meeting on June 3rd, and in moving the adoption of the report and accounts (ELEC. REV., May 29th, p. 865) referred to the death of Mr. A. M. Quill, one of the directors, and the election of Col. G. R. C. Westropp, C.B., to the vacancy on the board. He said that outstanding features of the expenditure were a reduction in the price of coal and an increase in maintenance costs. The growth of the business was maintained during the year, both the number of new consumers and the total connections showing a satisfactory increase. On the other hand, the industrial depression had resulted in a number of their larger consumers taking reduced bulk supplies, which affected the total amount of energy sold. The benefits of bulk supplies were considerable, and he was glad to say that the prospects of obtaining more consumers of this class were promising, although the arrangements could not be completed soon enough to affect the current year's working, owing to the time taken up between the ordering and receipt of the necessary equipment. The operations during the past year had included the changing over from d.c. to a.c. in several portions of the area. The new 5,000-kW turbo-alternator was working satisfactorily and a 6,000-kW set, with the necessary boiler and converting plant, was being installed. A further 6,000-kW set had been purchased to meet future demands.

**British Electric Traction Co., Ltd.**

The directors' report for the year ended March 31st, 1924, states that the gross profit was £286,587, as compared with £278,[illegible] in the preceding year. After deducting general expenses and debenture interest there remains a balance of £162,220, which it is proposed to allocate as follows:—Dividend of 6 per cent. (3 per cent. already paid) on the preference shares; dividend of 7 per cent. (2 per cent. already paid) on the ordinary shares; and £2[illegible]17 to the undivided profits account, making £271,998. The reserve now stands at £520,000. During the year £19,8[illegible] of 4½ per cent. second debenture stock was purchased, and the discount (£3,893) has been applied in reduction of the aggregate book value of the investments. The latter stand in the balance sheet at £4,467,729, an increase of £184,541. The revenue from investments represented an average rate of 5.59 per cent., as against 5.62 per cent. in 1923-24.

Meeting: June 15th.

**Cape Electric Tramways, Ltd.**—An interim dividend of 3 per cent., free of tax, has been declared, as in 1924.

On June 17th, a meeting of the holders of the company's 5 per cent. first mortgage debentures is to be held for the purpose of considering the following proposals:—The extension of the period of the debentures to July 1st, 1935; the increasing of the rate of interest to 6 per cent.; the paying-off of the debentures at 103 per cent. by means of ten annual drawings; and the giving to the directors power to redeem the whole of the debentures at 106 per cent. at any time. The whole of the 6 per cent. first mortgage debentures are to be redeemed by next July.

**Czecho-Slovakian Company.** — *Reuter* says that the report of the *Skoda Works* stated that, with a capital of 200 million Czecho-Slovak crowns, there was a net profit for the past financial year of 32,200,000 crowns, a decrease of 6 millions, as compared with the preceding year. On the other hand, 102 millions was transferred to "debit reserves," as compared with 47 millions in the preceding year while the "other reserves" reached 82 millions. Five millions was assigned to the various employés' funds. A dividend was declared of 40 crowns, as compared with 32 crowns last year. The report showed that the orders received had enabled a larger number of hands to be employed than in 1923.

**Middleton Electric Traction Co., Ltd.** — The report for 1924 shows a revenue of £38,751 and a net profit of £7,703. The addition of £2,060 brought forward makes available £9,763, and it is proposed to pay a dividend of 5 per cent. on the ordinary shares, and to carry forward £4,766. Negotiations with the authorities concerned have resulted in the acceptance of an offer for the purchase of the company's light railway undertaking for the sum of £79,000, plus the value of spare parts, &c.

**Manila Electric Corporation.**—The report for 1924 shows that both the gross receipts and expenses increased, while the net operating income rose by $87,449 to $1,838,801. After meeting interest charges and allocating $240,000 to renewals, there remained $1,124,049. The four quarterly dividends absorbed $595,000, leaving $529,049 to be added to the surplus.

**Ruston & Hornsby, Ltd.**—The profit for the year ended March 31st last was £98,868, as compared with £85,810. It is proposed to pay off two years' arrears in respect of the dividends on the five per cent. and six per cent. preference shares, bringing payment up to December 31st last. The ordinary dividend is to be passed for the fifth successive year.

**Shropshire, Worcestershire, and Staffordshire Electric Power Co.**—The holders of the company's 7 per cent. redeemable cumulative preference shares (50,000 of £1 each) have been notified that the company intends to redeem these at par on December 31st, 1925. Terms are to be announced on which holders may take up other shares in their place.

**West Coast of America Telegraph Co., Ltd.**—The report for 1924 shows a net profit of £6,737; to this is added £7,767 brought forward, making £14,504. After the payment of the preference dividend, £2,000 is transferred to general reserve, and £6,605 is carried forward.

**La Plata Electric Tramways Co., Ltd.**—The net profit for the past year was £18,234, an increase of £4,343. Adding £5,410 brought forward gives an available balance of £23,644. A dividend of 3 per cent. is being paid on the cumulative preference shares.

**Swedish Company.**—According to *Goteborgs Handelstidning*, the Luth och Rosens Elektriska A.B. reports a loss of 932,000 kr for 1924, as compared with 824,000 kr. in the previous year, the deficit consequently rising to 5,895,000 kr. on a share capital of 12,220 000 kr.

**Guest, Keen & Nettlefolds, Ltd.** — The directors recommend a final dividend of 1s. per share on the ordinary shares, making 10 per cent., tax free, for the year ended March 31st last.

**Oriental Telephone & Electric Co., Ltd.**—The directors recommend a bonus of 2 per cent. (free of tax) on the ordinary shares in addition to the dividend for 1924 at the rate of 10 per cent. per annum (free of tax) already announced.

**Thames Valley Traction Co., Ltd.**—The report for 1924 records a net profit of £261, after allocating £15,000 to depreciation and £500 to general reserve. The total amount available is £2,539, and this is carried forward.

**Stock Exchange Notice.**—The undermentioned have been ordered to be officially quoted:—

Lido Electric Light Co., Ltd.—£600,000 6 per cent. sterling bonds Nos. 16,501 to 19,500.

**Ever Ready Co. (Great Britain), Ltd.**—The company is offering 34,108 unissued £1 preference shares to existing shareholders at the price of 21s. each.

**German Company.**—The *Hagen Accumulatoren-Fabrik Gesellschaft*, of Hagen, reports a net profit of 1,260,190 marks for the last year; a dividend of 5 per cent. is being declared.

**Canadian General Electric Co.**—A dividend of 1¾ per cent. has been declared on the preference stock in respect of the quarter ending June 30th.

# Stocks and Shares.

MONDAY EVENING.

CONDITIONS in the general markets of the Stock Exchange do not favour the idea that the House will be over-burdened with work for the next few months. Some members are even talking of the possibility that the summer quietude has already set in. Heaviness amongst the gilt-edged stocks is attributed to the over-dose of new issues that has recently made its appearance, while the fresh depreciation of the value of the franc, and the serious trouble at Shanghai have contributed to the causes that make for hesitation on the part of the investor. Business is exceedingly active in rubber shares. Apart from this market, however, no department in the Stock Exchange can claim more than a moderate amount of public attention.

The rumours which have recently filled the air in connection with possible new issues of capital by electricity supply companies need to be received with a certain amount of caution. For, although some people talk about a prompt settlement of the questions that surround the valuation of the companies' reserves and think that these matters can be dealt with in the course of a fortnight or so, there are other authorities who maintain that it will take more than a month or two in order to thrash out points which may present unexpected difficulties when they come to be tested. One or two of the big London companies are supposed to have new issues close at hand, but the consideration just advanced deserves to be kept in mind by those who are impatiently awaiting an opportunity for offering fresh capital to a prosperous industry.

Bournemouth & Poole are dull at 2¾, South Londons slipped back to 2 7/16. Urbans and Edmundsons are both easier, the former dropping rather sharply to 15s. 9d. St. James's at 13¾ are ¼ up. Apart from these changes, the supply list is uninteresting and trade in the leading shares continues to be very quiet.

Manila Electric Corporation shows an increase in net operating income of $87,500. The price of the shares stands at 42¼ middle. They are of no nominal value. British Columbia Electric preferred and deferred are both a point higher; Anglo-Argentine Tramway 5 per cent. debenture has similarly improved, the price of the latter being now 74. The Cape Electric Tramways Company has announced an interim dividend of 3 per cent. free of tax, payable on June 13th. The price of the shares is 2⅜. British Electric Traction preference has again risen, the price now standing at 110¼, thanks to the issue of a report which can only be regarded as exceedingly good in view of the difficulties that have hindered tramway undertakings during the past year. In Mexicans there is not much going on, and other tramway stocks are steady. Brazilian Tractions have gone back a little, in spite of the satisfactory way in which the rate of exchange moves in favour of the country.

Montreal Light & Power stock at 199 is 6 up, and Shawinigan Water at 153¼ has risen 1. Most of the dollar stocks continue to show improvements where they move at all, but interest in American and Canadian securities remains at a low ebb, and it is thought likely that some time will yet have to elapse before anything approaching a free market becomes re-established in London in these issues.

Oriental Telephones rose ¼ to 2 3/16, on the declaration of a bonus making 12 per cent. dividend in all, the same as that of a year ago. The announcement of the bonus came a few days after the declaration of the dividend, the interval causing a little surprise. The Stock Exchange is more accustomed to such declarations being made simultaneously, and at first it was thought that the Oriental Telephone directors might have decided not to distribute the bonus in respect of the year just ended.

The Eastern group leans to the dull side, notwithstanding the satisfactory reports to which attention was drawn here last week. Marconis have weakened to 1 9/16 sellers, some people in the market calling the price 30s. Wireless shares are out of favour, and it may be that some of the proprietors are becoming weary of the long wait for the expected Government payment to be made to the company in respect of the war services for which it has not yet been compensated.

Underground Electric income bonds have strengthened to 98, but the Home Railway market as a whole is heavy, and Metropolitans drooped, in sympathy with the steam stocks, to 74¼. There is no trade doing in Home Rails; investment regards this market with a good deal of suspicion on account of the always-recurring fear of labour difficulties.

General Electrics at 24s. 9d. are 1s. up, the buying being based upon expectations of a dividend announcement, due in the course of the next few days. As previously mentioned, the cautious folk are going for 7 per cent., though some others talk of a higher rate. Johnson & Phillips touched 40s. before reacting to 38s. 9d. India Rubber shares have drooped, and so have British Aluminium ordinary. On the other hand, English Electrics at 18s. 9d. are the pence higher. An enormous amount of business is being done in rubber shares public imagination having been seized by the remarkable rise in the price of the raw product, and the conviction that this means a very substantial addition being made to the profits of the producing companies in respect of the current year. The City electricity undertakings will get rid of an appreciable amount of current this Settlement Week in the many Stock Exchange offices whose staffs are working into the wee sma' hours of the mornings.

# Share List of Electrical Companies.

### HOME ELECTRICITY COMPANIES.

| | Nom. £ | Dividend. 1923. | Dividend. 1924. | Price June 8 1925. | Rise or fall. | Yield. p.c. |
|---|---|---|---|---|---|---|
| Bournemouth and Poole ... | 1 | 13 | 14 | 2⅞ | — 1/16 | 5 1 10 |
| Brompton Ordinary ... ... | 1 | 10 | 10 | 1⅝ | — | *5 14 3 |
| Charing Cross Ordinary ... ... | 1 | 14½ | 15 | 46/9 | — | 6 8 2 |
| do. do. do. 4½ Pref. | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Chelsea ... ... ... ... | 1 | 12 | 12 | 1⅝ | — | 6 8 0 |
| City of London ... ... ... | 1 | 15 | 15 | 48/3 | — | 6 4 3 |
| do. do. 6% Pref. ... | 1 | 6 | 6 | 23/6 | — | 5 2 2 |
| Clyde Valley ... ... ... | 1 | 8 | 8 | 32/6 | — | 4 18 6 |
| County of London ... ... ... | 1 | 15 | 15 | 9¾ | — | 5 9 1 |
| do. do. 6% Pref. ... | 1 | 6 | 6 | 23/- | — | 5 4 4 |
| Edmundson's Ordinary ... ... | 1 | 7 | — | 23/- | —6d. | 6 1 9 |
| do. 7% Pref. ... ... | 1 | 6 | 7 | 22/- | — | 6 7 3 |
| Elec. Supply Corporation ... | | 10 | 10 | 33/3 | — | 6 0 4 |
| Kensington Ordinary ... ... | 5 | 14 | 15 | 12⅝ | — | 5 16 6 |
| Lancs. Light and Power ... | 1 | 7½ | 7½ | 27/- | — | 5 11 1 |
| London Electric ... ... ... | 1 | 10 | 10 | 35/- | +6d | 5 14 3 |
| do. do. 6% Pref. ... | 5 | 6 | 6 | 6⅝ | — | 5 6 8 |
| Metropolitan ... ... ... | 1 | 10 | 11 | 38/3 | — | 5 15 0 |
| do. 4½% Pref. ... ... | 1 | 4½ | 4½ | 17/6 | — | 5 2 10 |
| Midland Counties ... ... ... | 1 | 5½ | 6 | 24/3 | — | 4 19 0 |
| Newcastle-on-Tyne Ordinary ... | 1 | 6 | 7 | 42/- | — | 6 7 3 |
| do. 5% Pref. ... | 1 | 5 | 5 | 18/9 | — | 5 6 8 |
| do. 7% Pref. ... | 1 | 7 | 7 | 25/- | — | 5 12 0 |
| Notting Hill 6% Pref. ... ... | 10 | 6 | 6 | 10 | — | 6 0 0 |
| North Met. Elec. 6% Pref. ... | 1 | 6 | 6 | 1⅛ | — | 5 6 8 |
| St. James' and Pall Mall ... | 5 | 17½ | 17½ | 13⅝ | + ¼ | 6 7 3 |
| South London ... ... ... | 1 | 15 | 15 | 2⅞ | — 1/16 | 6 3 1 |
| South Metropolitan Pref. ... | | 7 | 7 | 1⅛ | — | 5 19 0 |
| Urban Ordinary ... ... ... | 1 | 4 | 4 | 15/9 | —1/9 | 5 1 7 |
| do. 6% Pref. ... | 1 | 6 | 6 | 20/- | — | 6 0 0 |
| Westminster Ordinary ... ... | 1 | 15 | 15 | 46/6 | — | 6 9 0 |
| Whitehall Elec. Invst. 7½% Pref. | 1 | 7½ | 7½ | 19/6 | — | 7 13 10 |
| Yorkshire Elec. ... ... ... | 1 | 8 | 8 | 31/- | — | 5 3 3 |

### HOME RAILS.

| | | | | | | |
|---|---|---|---|---|---|---|
| Central London Ord. Assented | Stock | 4 | 4 | 69 | — | 5 15 11 |
| Metropolitan ... ... ... | ,, | 4 | 5 | 74½ | - ½ | 6 14 3 |
| do. District ... ... | ,, | 3½ | 3½ | 48⅛ | — | 7 4 4 |
| Underground Electric Ordinary | 10 | Nil | Nil | 2¾ | — | Nil |
| do. do. "A" ... | 1/- | Nil | Nil | 8/- | — | Nil |
| do. do. Income | Bonds | 6 | 6 | 98 | +1 | *6 2 5 |

### TELEGRAPHS AND TELEPHONES.

| | | Dividend. 1922. | Dividend. 1923. | | | |
|---|---|---|---|---|---|---|
| Anglo-Am. Tel. Pref. ... ... | Stock | 6 | 6 | 105 | — | 5 14 3 |
| do. Def. ... ... | ,, | 1½ | 1½ | 24⅜ | — | 6 1 |
| Automatic Telephone ... ... | 1 | Nil | 3 | 2½ | — | 2 18 1 |
| Chili Telephone ... ... ... | 5 | 6 | 6 | 8⅛ | — | *5 7 10 |
| Cuba Sub. Ord. ... ... ... | 10 | 7 | 5 | 6¼ | — ¼ | 7 8 2 |
| Eastern Extension ... ... | 10 | 10 | 10 | 17⅝ | — ⅜ | *5 15 |
| Eastern Tel. Ord. ... ... ... | Stock | 10 | 10 | 175½ | — | *5 14 0 |
| Globe Tel. and T. Ord. ... ... | 10 | 10 | 10 | 17⅞ | — ⅛ | *5 11 11 |
| do. do. Pref. ... ... | 10 | 6 | 6 | 11⅛ | — | 5 7 10 |
| Great Northern Tel. ... ... | 10 | 24 | 22 | 31½ | — ½ | 6 19 |
| Indo-European ... ... ... | 25 | 7 | 7 | 41½ | — | *4 4 |
| Marconi ... ... ... ... | 1 | 15 | 10 | 1⅛ | — ⅛ | 6 8 0 |
| Marconi Marine ... ... ... | 1 | 10 | 10 | 1 | — | 10 0 0 |
| Oriental Telephone Ord. ... | 1 | 12 | 12 | 9½ | + ¼ | *5 |
| United R. Plate Tel. ... ... | 5 | 8 | 8 | 7⅛ | — | *5 13 3 |
| Western Telegraph ... ... | 10 | 10 | 10 | 17 | — | *5 17 8 |

### HOME AND FOREIGN TRAMS, &c.

| | | | | | | |
|---|---|---|---|---|---|---|
| Anglo-Arg. Trams First Pref. ... | 5 | 12½ | 5½ | 8½ | — | 8 9 3 |
| do. do. 2nd Pref. ... | 5 | 5½ | 6 | 2⅝ | — | 10 7 10 |
| do. do. 5% Deb. ... | Stock | 5 | 5 | 74 | +1 | 6 15 2 |
| British Electric Traction Ord. ... | ,, | 5 | 6 | 112½ | — | 6 5 0 |
| do. do. 6% Pref. ... | ,, | 6 | 6 | 110½ | +1 | 5 8 7 |
| Brazil Traction ... ... ... | 100 | 4 | 4 | 55 | — ½ | 7 4 2 |
| Brit. Columbia Elec. Rly. Pcc. | Stock | 5 | 5 | 89½ | — | 5 11 9 |
| do. do. Preferred | ,, | 6 | 96/- | 90½ | +1 | *5 5 0 |
| do. do. Deferred | ,, | 8 | 129/5 | 109½ | +1 | *5 19 2 |
| do. do. Deb. | ,, | 4½ | 4½ | 77½ | — | 5 9 8 |
| Lond. & Sub. Trac. 5% Pref. ... | 1 | 5 | 5½ | 6/6 | — | Nil |
| London United Tram. Deb. ... | Stock | 4 | 4 | 47⅛ | — | 8 8 5 |
| Mexico Trams, 5% Bonds ... | — | Nil | 5 | 65½ | — ½ | 7 12 8 |
| Mexican Light Common ... | 100 | Nil | Nil | 27 | — | Nil |
| do. Pref. ... ... | 100 | Nil | Nil | 61 | — | Nil |
| do. 1st Bonds ... | — | 5 | 5 | 66⅛ | —1 | 7 10 5 |
| Yorkshire (West Riding) ... | 1 | — | 5 | 18/9 | — | 5 6 8 |

### MANUFACTURING COMPANIES.

| | | | | | | |
|---|---|---|---|---|---|---|
| Babcock & Wilcox ... ... | 1 | 20 | 12 | 2⅜ | — | *4 8 1 |
| British Aluminium Ord. ... ... | 1 | 5 | 5 | 31/3 | — 1/16 | 8 4 0 |
| British Elec. Transformer Pref. | 1 | Nil | Nil | 17/6 | — | ... ... |
| British Insulated Ord. ... ... | 1 | 15 | 15 | 3⅛ | — | 4 10 3 |
| Brush Ord. ... ... ... ... | 1 | 10 | 10 | 22/6 | — | 8 17 10 |
| Callenders ... ... ... ... | 1 | 15 | 15 | 3 1/16 | — | 4 10 7 |
| do. 6½% Pref. ... ... | 1 | 6½ | 6½ | 23/9 | — | 5 9 5 |
| Crompton Ord ... ... ... | 1 | 5 | Nil | 5/8 | — | ... ... |
| Edison-Swan ... ... ... | 4/- | 7½ | 10 | 7/9 | — | 5 1 7 |
| do. 5% Deb. ... ... | Stock | 5 | 5 | 82½ | — | 6 1 3 |
| Electric Construction ... ... | 1 | 10 | 10 | 33/9 | — | 5 19 10 |
| Enfield Cable, Pref. ... ... | 1 | 7½ | 7½ | 1½ | — | 6 0 0 |
| English Electric ... ... ... | 1 | 8 | 5 | 18/9 | +9d. | 5 6 8 |
| do. do. Pref. ... ... | 1 | 6 | 6 | 21/- | — | 5 14 3 |
| Gen. Elec. Pref. ... ... ... | 1 | 6½ | 6½ | 23/6 | — | 5 10 8 |
| do. Ord. ... ... ... | 1 | 5 | 5 | 24/9 | +1/- | 4 0 10 |
| Henley ... ... ... ... | 1 | 15 | 15 | 3½ | — | 4 12 4 |
| do. 4½% Pref. ... ... ... | 5 | 4½ | 4½ | 4½ | — | 5 6 0 |
| India-Rubber ... ... ... | 1 | 10 | 5 | 1 1/16 | — 1/16 | *4 14 1 |
| Johnson & Phillips ... ... | 1 | 5 | 10 | 1⅛ | + ¼ | 5 3 3 |
| Met-Vickers, Ord.... ... ... | 1 | 12½ | 8 | 23/3 | — | 6 17 8 |
| do. Pref.... ... ... | 2 | 8 | 8 | 2⅜ | — | 6 14 9 |
| Siemens Ord. ... ... ... | 1 | 5 | — | 7/6 | — | *4 12 9 |
| Telegraph Construction ... | — | 12 | 20 | 27/- | — | 4 9 0 |

* Dividends paid free of Income Tax.

# Market Quotations for Chemicals and Metals.

IT should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general and they may vary according to quantities and other circumstances.

| CHEMICALS, &c. | Price June 9. | Fortnight's Inc. or dec. |
|---|---|---|
| a Acid, Oxalic ... ... ... ... per lb. | 8¾d. | ... |
| a Ammoniac, Sal ... ... ... per ton | £60 | ... |
| a Ammonia, Muriate (large crystal) ,, | £52 | ... |
| a Bisulphide of Carbon ... ... ,, | ... | ... |
| a Borax ... ... ... ... ,, | £25 | ... |
| a Copper Sulphate ... ... ... ,, | £26 10s. | ... |
| a Potash, Chlorate ... ... per lb. | 4d. to 4½d. | ... |
| a ,, Perchlorate ... ... ,, | 5½d. | ... |
| a Shellac ... ... ... ... per cwt. | £15 15s. | ... |
| a Sulphur, Sublimed Flowers ... ,, | £7 15s. | ... |
| a ,, Roll ... ... ... ,, | £7 15s. | ... |
| a Soda, Chlorate ... ... ... per lb. | 3¼d. to 3½d. | ... |
| a ,, Crystals ... ... ... per ton | £5 to £5 5s. | ... |
| a Sodium Bichromate, casks ... per lb. | 4d. | ... |
| **METALS, &c.** | | |
| b Aluminium, Ingots ... ... ... per ton | £120 to £125 | ... |
| b ,, Wire ... ... ... per lb. | 1/9 to 2/6* | ... |
| b ,, Sheet ... ... ... ,, | 1/6 to 2/- | ... |
| p Babbitt's Metal and Anti-friction Metal— | | ... |
| Grade I ... ... ... per ton net | £230 | ... |
| Grade II ... ... ... ,, ,, | £164 | ... |
| Grade III ... ... ... ,, ,, | £92 | ... |
| c Brass (rolled metal 2" to 12" basis) per lb. | 9¾d. | ... |
| c ,, Tubes (solid drawn) ... ,, | 11⅜d. to 1/- | ... |
| c ,, Wire, basis ... ... ... ,, | 9¼d. | ... |
| c Copper Tubes (solid drawn) ... ,, | 1/1 | ... |
| c ,, Bars (best selected) ... per ton | £90 | ... |
| c ,, Sheet ... ... ... ,, | £90 | ... |
| c ,, Rod ... ... ... ... ,, | £90 | ... |
| d ,, (Electrolytic) Bars ... ,, | £63 10s. | 5s. dec. |
| d ,, Sheets ... ,, | £143 10s. | ... |
| d ,, Wire Rods ... ,, | £78 10s. | 5s. dec. |
| d ,, H.C. Wire per lb. | 9¼d. | ⅛d. dec. |
| f Ebonite Rod ... ... ... ... ,, | 2/- to 3/6 | ... |
| f ,, Sheet ... ... ... ... ,, | 2/- to 3/6 | ... |
| n German Silver Wire ... ... ,, | 2/3 | ... |
| h Gutta-percha, fine ... ... ... ,, | 8/4 | ... |
| h India-rubber, Para fine ... ... ,, | 2/4 | 2d. inc. |
| i Iron Pig (Cleveland Warrants) ... per ton. | nom. | ... |
| l ,, Wire, galv. No. 8, P.O. qual. ,, | £23 | ... |
| g Lead, English Pig ... ... ... ,, | £35 5s. | 2½- inc. |
| g Mercury ... ... ... ... per bot. | £13 15s. to £14 | 2/6 inc. |
| e Mica (in original cases) small ... per lb. | 3d. to 3/- | ... |
| e ,, ,, medium ,, | 4/- to 8/- | ... |
| e ,, ,, large ... ,, | 10/- to 20/- & up. | ... |
| p Phosphor Bronze, plain castings ,, | 1/3½ | ... |
| p ,, ,, drawn bars & rods ,, | 1/8 | ... |
| p ,, ,, rolled strip & sheet ,, | 1/3½ | ... |
| p ,, ,, wire ... ... ... ,, | 1/3½ | ... |
| o Platinum ... ... ... ... per oz. | £3[illegible] | ... |
| d Silicium Bronze Wire ... ... per lb. | 1/0½ | ... |
| r Steel, Magnet, in bars ... ... ,, | 7½d. | ... |
| n Tin, Block (English) ... ... per ton. | £251 to £254 5s. | 5/- to 10/- inc. |
| b ,, Wire, Nos. 1 to 16 ... ... per lb. | 3/11 | 1d. inc. |

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Mathey & Co., Ltd.
r C. Clifford & Son, Ltd.
W F Dennis & Co

**Electricity Supply in New South Wales.**—The *Industrial Australian and Mining Standard* reports that Mr. A. O. Brain, Assistant Railway Commissioner (chairman); Mr. G. A. Julius, of Julius, Poole & Gibson; Mr. Donoghue, Electric Light and Power Corporation, Balmain; Mr. Guy Allbut, Newcastle City Council electrical engineer; and Mr. Forbes McKay, general manager of the Sydney Electricity Department, have been appointed by the State Government of New South Wales as members of the expert committee recently decided on by the Cabinet to inquire into the question of electricity supply as affecting the City of Sydney and its environs, and also the whole of New South Wales. In the event of Mr. McKay's not being available, the chief electrical engineer of the Public Works Department, Mr. H. G. Carter, will be the fifth member of the committee.

**Platinum and Allied Metals Statistics.**—Statistics on platinum and allied metals of the mineral industry of the British Empire and foreign countries, issued by the Imperial Mineral Resources Bureau, show that in 1922 70,400 crude troy ounces of platinum metals was produced in the world, against 45,000 in 1921, and 50,000 in 1920. Of this figure 1,400 ounces was produced in the British Empire. In 1922 6,624 ounces of unrefined platinum was imported into the United Kingdom, 38 ounces of which was from the British Empire, against 1,849 in 1920, the total exports and re-exports being 1,374 ounces in 1922 and 291 in 1920. The refined platinum imports for 1922 are shown as 2,530 ounces, against 879 for 1920, the total exports and re-exports being 1,873 ounces, against 4,595 for 1920. The U.S.A. imported 94,591 ounces and exported 1,456 ounces in 1922. The statistics are issued in book form from H.M. Stationery Office, price 1s. net.

# The Pensions Bill.

By JOS. J. H. STANSFIELD.

PARLIAMENT is now considering the Widows', Orphans' and Old Age Contributory Pensions Bill, and judging from the majorities in the Division Lobby, it appears likely that the Bill will become law during the present session subject to such alterations in detail as may take place during its progress through Parliament. It will, therefore, be of interest to consider the provisions of the Bill which will affect those who are engaged in the electrical industry. The Bill has been issued with an explanatory memorandum dealing with the objects and scope of the scheme and the benefits provided, together with a report by the Government Actuary on the financial provisions of the Bill.

The first clause provides that pensions shall be payable (*a*) to the widow of an insured man at the rate of 10s. per week, with an additional allowance for children under the age of 14 at the rate of 5s. for the first and 3s. for each other child; (*b*) to orphaned children under the age of 14 of an insured man, or an insured widow, at the rate of 7s. 6d. per week for the first and 6s. for each succeeding child; and (*c*) to an insured man or insured woman of 65 and over, who has not attained the age of 70 and to the wife of an insured man who has attained the age of 65, but not the age of 70, of 10s. per week. It will be noted that the pension under the Bill ceases at the age of 70, because, from that age, the Old Age Pensions Acts 1908 to 1924 will apply, with the difference that under Section 39 of the present Bill it is provided that the pension shall be payable notwithstanding that any of the statutory conditions under the beforementioned Acts as to means, residence, or nationality is not satisfied, and notwithstanding that the yearly means exceed the amount which would disqualify him or her for a pension.

The object of the Bill is to extend the social services provided for the working population by adding to the existing schemes of health insurance, unemployment insurance, and workmen's compensation, and the Bill, which extends to Great Britain, establishes the new scheme on a contributory and compulsory basis, interlocked with the present scheme of health insurance. It is estimated that the number of employed persons under the age of 65, who will come into insurance at the commencement of the scheme, will, with those who will be added in January, 1926, under the provisions of the Bill, total over 15,000,000.

The Bill provides for widows and children of insured men who died before the inception of the scheme, and also for insured persons who have attained the age of 70, or who attained that age before the date on which old age pensions begin to be payable under the scheme, but the pension is not payable to a widow if she has remarried before the commencement of the Act, and if at the commencement of the Act, there is not living at least one child of the marriage, or of any former marriage of either parent, under the age of 14. Furthermore, the widow's pension ceases to be payable after the youngest child attains the age of 14.

The statutory conditions to be complied with involve a minimum period of insurance and the payment of a minimum number of contributions and insurance for the purposes of the National Health Insurance Act, and contributions paid under that Act before the new scheme begin will count towards satisfying the qualifying conditions. A further condition is that the insured person must have been continuously resident in Great Britain for at least two years immediately prior to his death, or, in the case of an old age pension, prior to the date of his attaining the age of 65, and his last employment, excluding temporary employment, must have been in Great Britain.

There are various dates for the commencement of the scheme, Clause 45 providing that provisions as to pensions to widows and orphans shall commence from January 4th, 1926, provisions as to unrestricted old age pensions awarded to, or in respect of, persons over 70 on July 2nd, 1926, and provisions as to other old age pensions on January 2nd, 1928.

The ordinary rates of contribution commencing from January 4th, 1926, will be 9d. for a man, of which half will be payable by the employer and the employé respectively, and 4½d. for a woman, of which 2½d. will be payable by the employer and 2d. by the employé, but as a result of the reduction of the health insurance age from 70 to 65, the health insurance contribution is being reduced by 1d. per week in the case of men and ½d. per week in the case of women, so that the net increase, consequent on the scheme, is 8d. for a man and 4d. for a woman, equally divided between the employer and the employé. Lower rates of contribution are applicable to exempt persons and, in certain circumstances, to special classes of insured persons. Contributions are payable in respect of every employed person under the age of 70 until January 2nd, 1928, but from that date such contributions cease to be payable on his attaining the age of 65 when his right to sickness and disablement benefit (but not to medical benefit) under the health insurance scheme, as well as his right to unemployment benefit, will cease. The employer will, however, be required to pay a contribution equivalent to his share of the combined contribution for health insurance and pensions in addition to unemployment insurance contributions, the object of this provision being to remove any temptation, which might otherwise exist, to give a preference for employment to men over the age of 65.

These contributions will entail an additional burden on industry, and it is in respect of this that the greatest criticism of the Bill arises. The Government Actuary sets out at some length many of the statistics used by the Chancellor of the Exchequer, particularly with regard to the number of employed contributors and the rate of contribution, and taking these figures as a basis, it is stated that the capital value of the liability to be assumed by the Exchequer in respect of persons brought within the scheme at the outset may be summarised as follows:—

| | Millions of pounds. |
|---|---|
| For employed persons in compulsory insurance ... ... ... ... | 566 |
| For voluntary contributors ... | 12 |
| For widowed mothers and children | 42 |
| For extended rights to old age pensions at 70 ... ... ... ... | 126 |
| Total ... ... | £746 millions. |

It has been stated that it is hoped that some amelioration of the charges upon industry may be arranged, and this is certainly desirable, particularly in the present state of trade.

The scheme is furnished with safeguards against abuse, as experience has shown, in connection with the unemployment benefit, that adequate precautions must be taken against unscrupulous persons attempting to obtain financial benefit to which they are not entitled, and there is a provision in the Bill which guards against marriages being made simply as a means of securing benefit, but it is doubtful whether a two-year residential qualification is sufficient to prevent the scheme being a lure to the workers of other countries. No other country in Europe offers to its workers such protection, and when the nationals of other States are approaching a pensionable age, the existence of such a scheme might cause a flood of immigrants into Great Britain; it is therefore to be hoped that the discussion on the Bill will result in adequate protection, because no one will desire that this country should become an asylum, either now or in the future, for the distressed population of the Continent.

# The Training of Power Supply Engineers.

## A Scheme Involving a Three-year Course of Training.

By F. G. BROMLEY, B.Sc.

MR. J. W. THOMAS'S article in the ELECTRICAL REVIEW of February 20th prompted the present writer to set out a course of training for prospective supply engineers, which is now actually in operation in one of the large London power supply undertakings; and also to attempt to give a brief idea of what must be the point of view of the majority of students of this branch of engineering. The opportunity of serving this particular course is given to students of about twenty years of age, preferably those holding degrees. The course is for three years, the hours and conditions of service being those appertaining to the department in which the student is for the time employed; and in order to render the scheme quite democratic, a weekly wage is paid to cover normal expenses. If the student is without previous theoretical training, attendance at evening classes is required of him, and his progress is carefully noted.

The course as set out by the company includes:—

1 week: Head office, general office.
1 week: Head office, meter department.
1 week: Head office, mains department.
1 week: Head office, development department.
1 week: Local showrooms.
1 week: Stores.
1 week: Sub-stations.
1 week: Generating station, maintenance.
1 week: Generating station, constructional.
3 months: Rotary and static sub-stations.
5 months: Generating department, boiler house, on construction, maintenance and repairs (including a fortnight's stoking).
5 months: Generating department, engine room, on construction, maintenance and repairs.
5 months: Constructional department: drawing office and testing.
3 months: Meter-testing and repairs.
10 months: Mains department.
3 months: Development department, technics and statistics.

*Total: 3 years.*

A student taking the course is given to understand that it is largely in his own hands whether, at the end of three years, he will be offered a position in the company; *i.e.*, he must show aptitude and initiative. This course takes the student rotationally through every branch of supply engineering—from the power house to the very doors of the consumers themselves; indeed, a day or two is devoted to meter reading. The time spent in the general office is a very wise provision, which gives an insight into the problems and difficulties of the commercial side of a supply undertaking. The development department shows how new consumers are obtained; a month is devoted to technics, statistics, estimates, &c.; while the rest of the course gives a complete training in practical engineering, both electrical and mechanical.

It is perhaps significant that in spite of the considered opinions of the E.P.E.A authorities and of Mr. Woodhouse and indeed of many others, the undertaking in question does not require that its students shall have attended—or shall attend in the future—a manufacturing workshop course or training (of a period suggested by the E.P.E.A. of two years). No more is asked than the three-year practical course, together with a sound theoretical training. This policy appears to the writer as being very excellent and sufficient; one needs in these days to be something of a specialist to be successful ultimately, and a two-years' course in manufacturing workshops seems to partake somewhat of the nature of irrelevance, as far as the supply engineer is concerned. In the modern power station—where expert mechanics are available day and night—the engineer gets very little scope for utilising a knowledge of manufacturing workshop principles. All that is really required is that he should know the best way to go about a job—not that he should be an expert fitter and turner. A keen student will get all the practical work and experience he needs for his future career in the power station: he can have the use of the workshops, take part in all manner of repair work, and see the results of the application of workshop principles to the running plant. A long period spent in manufacturing workshops would probably be found useful on occasion, but the time spent in acquiring the experience is not, in the writer's opinion, warranted by the small gain in proficiency.

There is another point of view which looms large in the minds of most prospective engineers; the student is invariably anxious to get to work on his first real responsible job, and if he is to go through the protracted training outlined by the E.P.E.A., he finds himself of a considerable age (as compared with pre-war ideas) before commencing life in real earnest. Take the case of the average public schoolboy who leaves school at the age of eighteen or nineteen; he may or he may not by then have matriculation to his credit; if not, he is delayed another few months. He goes to a university college for at least three years in order to obtain a degree (four years if he fails in his final first time); then two years in a workshop and two in a supply company brings him to the age of twenty-six before getting his first post.

To cite the writer's own particular case, he spent four years in an engineering public school, four years at a university college, and is now on a three-year course with a supply company; and another two years in manufacturing workshops will bring his total time spent on engineering before obtaining a post (with anything like a professional salary) up to thirteen years.

The young engineer leaving college, with four years of apprenticeship yet to serve, is seen to be at an enormous pecuniary and temporal disadvantage as compared with the young medical or dental student leaving hospital, who is able to command six guineas a week immediately as an assistant.

Something should surely be done about this question if supply engineering is to be given the status of a profession as understood in connection with medicine and law. Some companies seem to be doing their best in the matter by offering to young men a course, such as is outlined above, in which complete qualification is recognised in three years (theoretical education being permissibly acquired at evening classes); and incidentally are generous enough to provide them with about enough money to keep themselves. This seems a great improvement on the seven-year course suggested by the E.P.E.A., provided that men are turned out as proficient supply engineers, and this is the question which has to be decided, either by experience or by arbitration.

This raises the vexed question of the possibility of legislation for the complete protection of qualified engineers, which, in the writer's opinion, will be an exceedingly difficult ideal to attain for many years to come, because protection of the public is not in the question to anything like the same extent as in the cases of medicine and law, where delicacy and tact are so essential to practitioners in close touch with the community. It was only recently that the Dentists Act was brought into operation, and even then every man who had been practising for five years or more was included on the Register, presumably because the legislators were unwilling to deprive any man of his living.

Whatever the difficulties, it is certain that some recognised qualification and registration scheme is highly desirable; but the task of settling on the best form of training is as difficult as it is important, and it will be seen that the three-year course set out above is excellent in giving an adequate training to the student of supply engineering in as short a time as possible.

It is to be hoped that the authorities will consider some such scheme as this before finally deciding on the seven-year courses suggested by the E.P.E.A.

# Ceylon's Electrical Imports.

THE following table shows the value of Ceylon's imports of electrical and allied materials during the past year. The figures have been taken from the recently published official returns. The corresponding statistics for 1923 have been added and notes of decrease or increase are also given :—

| | 1923. Rupees. | 1924. Rupees. | Inc. or Dec. Rupees. |
|---|---|---|---|
| *Control and switchgear.*— | | | |
| Total, all from United Kingdom ... ... ... | 22,000 | 3,000 | – 19,000 |
| *Generators, alternators and dynamos.*— | | | |
| Total ... ... | 322,000 | 100,000 | – 222,000 |
| From United Kingdom ... | 317,000 | 95,500 | – 221,500 |
| ,, Germany ... ... | 1,000 | — | – 1,000 |
| *Motors.*— | | | |
| Total ... ... | 38,000 | 41,000 | + 3,000 |
| From United Kingdom ... | 27,000 | 37,000 | + 10,000 |
| ,, United States ... ... | 8,000 | 2,500 | – 5,500 |
| *Transformers and converters.*— | | | |
| Total ... ... | 3,000 | 14,000 | + 11,000 |
| From United Kingdom ... | 2,000 | — | – 2,000 |
| ,, United States ... ... | 1,000 | 14,000 | + 13,000 |
| *Magnetos, ignition.*— | | | |
| Total ... ... | 6,000 | 400 | – 5,600 |
| From United Kingdom ... | 1,300 | 150 | – 1,150 |
| ,, Germany ... ... | 400 | — | – 400 |
| ,, United States ... ... | 400 | — | – 400 |
| *Electric wires and cables (insulated).*— | | | |
| Total ... ... | 218,000 | 340,000 | + 122,000 |
| From United Kingdom ... | 215,000 | 338,000 | + 123,000 |
| ,, Germany ... ... | 2,000 | 1,000 | – 1,000 |
| *Telegraph and telephone instruments and apparatus.*— | | | |
| Total ... ... | 151,000 | 128,000 | – 23,000 |
| From United Kingdom ... | 146,000 | 105,000 | – 41 000 |
| ,, United States ... ... | 3,000 | 12,000 | + 9,000 |
| ,, Sweden ... ... | — | 9,000 | + 9,000 |
| *Electric lighting accessories and fittings, including switches.*— | | | |
| Total ... ... | 182,000 | 416,000 | + 234,000 |
| From United Kingdom ... | 111,000 | 325,000 | + 214,000 |
| ,, Germany ... ... | 18,000 | 24,000 | + 6,000 |
| ,, United States ... ... | 27,000 | 27,000 | — |
| ,, Holland ... ... | 12,000 | 29,000 | + 17,000 |
| *Electrical goods and apparatus not elsewhere specified.*— | | | |
| Total ... ... | 200,000 | 369,000 | + 169,000 |
| From United Kingdom ... | 159,000 | 302,000 | + 143,000 |
| ,, Australia ... ... | 13,000 | — | – 13 000 |
| ,, India ... ... ... | — | 13,000 | + 13,000 |
| ,, Italy ... ... ... | 1,000 | — | + 1,000 |
| ,, United States ... ... | 14,000 | 29,000 | + 15,000 |
| ,, Germany ... ... | 7 000 | 14,000 | + 7,000 |
| *Electrical machinery not elsewhere specified.*— | | | |
| Total ... ... | 80,000 | 119,000 | + 39,000 |
| From United Kingdom ... | 38,000 | 84,000 | + 46,000 |
| ,, Germany ... ... | 12,000 | 10,000 | – 2,000 |
| ,, United States ... ... | 22,000 | 10,000 | – 12,000 |
| ,, Holland ... ... | 4,000 | — | – 4,000 |
| *Machinery belting, leather.*— | | | |
| Total ... ... | 67,000 | 36,000 | – 31,000 |
| From United Kingdom ... | 62,000 | 30,000 | – 32,000 |
| ,, India ... ... ... | 5,000 | 500 | – 4,500 |
| ,, Germany ... ... | — | 4,000 | + 4,000 |
| *Machinery belting, other than leather.*— | | | |
| Total ... ... | 282,000 | 358,000 | + 76 000 |
| From United Kingdom ... | 278,000 | 349,000 | + 71,000 |
| ,, India ... ... ... | 1,000 | — | – 1,000 |

NOTE : Rs. 15 = £1.

**Canadian Power Export Duty.**—Regulations were established on April 18th, by the Governor-General in Council, governing the collection by the Minister of Trade and Commerce of the export duty on hydro-electric power, amounting to three hundredths of 1 cent per kWh (equivalent to $1.95 per horsepower-year), effective from April 1. The regulations provide that the duty shall be paid monthly by the contractor, the amount to be computed from figures giving the total kWh output for export, shown on the monthly return. Contractors who fail to comply with the requirements are liable to a penalty of $50 for every day during which such default continues.—*Commerce Reports.*

# Italy's Electrical Trade.

THE following statement, showing the imports into and exports from Italy of electrical goods during 1924 has been compiled from the recently-issued official trade statistics. The figures for 1923 are added for purposes of comparison and notes of any increases or decreases are made.

IMPORTS.

| | 1923. Quintals. | 1924. Quintals. | Inc. or Dec. Quintals. |
|---|---|---|---|
| *Electric generators and motors.*— | | | |
| Total ... ... | 15,500 | 17,000 | + 1,500 |
| From Austria ... ... | 800 | 700 | – 100 |
| ,, Germany ... ... | 8,100 | 6,200 | – 1,900 |
| ,, Great Britain ... ... | 900 | 270 | – 630 |
| ,, Hungary ... .. | 4,000 | 2,700 | – 1,300 |
| ,, United States ... ... | 200 | 2,000 | + 1,800 |
| *Static transformers.*— | | | |
| Total ... ... | 8,700 | 6,700 | – 2,000 |
| From Austria ... ... ... | 200 | 200 | — |
| ,, Germany ... ... | 6,400 | 4,100 | – 2,300 |
| ,, Germany (Reparation account) ... ... | 20 | 640 | + 620 |
| ,, United States ... ... | 700 | 1,200 | + 500 |
| *Electricity meters.*— | | | |
| Total ... ... | 8,000 | 7,000 | – 1,000 |
| From Germany ... ... | 7,000 | 6,000 | – 1,000 |
| *Telegraph and telephone apparatus.*— | | | |
| Total ... ... | 3,500 | 1,800 | – 1,700 |
| From Germany ... ... | 2,800 | 600 | – 2,200 |
| ,, Germany (Reparation account) ... ... | — | 270 | + 270 |
| ,, United States ... ... | 30 | 50 | + 20 |
| ,, Belgium ... ... | 300 | 150 | – 150 |
| *Carbons, electric.*— | | | |
| Total ... ... | 43,000 | 50,000 | + 7,000 |
| From Germany ... ... | 16,500 | 13,700 | – 2,800 |
| ,, Jugo-Slavia ... ... | 9,000 | 10,600 | + 1,600 |
| ,, United States ... ... | 15,000 | 19,000 | + 4,000 |
| *Insulators, porcelain, &c.*— | | | |
| Total ... ... | 14,000 | 23,000 | + 9,000 |
| From Germany ... ... | 6,800 | 13,800 | + 7,000 |
| ,, United States ... ... | 4,700 | 3,600 | – 1,100 |
| *Steam boilers.*— | | | |
| Total ... ... | 26,000 | 39,000 | + 13,000 |
| From Germany ... ... | 12,000 | 19,500 | + 7,500 |
| ,, Great Britain ... ... | 8,000 | 7,900 | – 100 |
| ,, Czecho-Slovakia ... | 3,800 | 10,000 | + 6,200 |
| ,, Switzerland ... ... | 500 | 100 | – 400 |
| *Electric lamps.*— | | | |
| Total ... ... | 12,688 | 13,099 | + 411 |
| From Austria ... ... ... | 2,368 | 2,414 | + 46 |
| ,, Germany ... ... | 2,067 | 4,278 | + 2,211 |
| ,, ,, (reparations) | 1,162 | 500 | – 662 |
| ,, Holland ... ... | 5,248 | 5,814 | + 566 |
| ,, Switzerland ... ... | 1,231 | 135 | – 1,096 |
| ,, Hungary ... ... | 458 | 332 | – 126 |
| *Insulated electric wire or cable, covered with rubber or textile* ... ... ... | 680 | 1,700 | + 1,020 |
| *Ditto, armoured, including submarine cables* ... ... | 2,100 | 3,000 | + 900 |

EXPORTS.

| | 1923. Quintals. | 1924. Quintals. | Inc. or Dec. Quintals. |
|---|---|---|---|
| **Insulated electric wire or cable, covered with rubber or textile* ... ... ... | 3,400 | 4,200 | + 800 |
| **Ditto, armoured, including submarine cable* ... ... | 21,700 | 20,000 | – 1,700 |
| *Electric generators and motors.*— | | | |
| Total ... ... | 16,200 | 17,800 | + 1,600 |
| To Belgium ... ... ... | 2,000 | 2,000 | — |
| ,, France ... ... ... | 1,800 | 1,500 | – 300 |
| ,, Spain ... ... ... | 1,900 | 2,000 | + 100 |
| ,, India ... ... ... | 2,700 | 2,300 | – 400 |
| ,, Argentina ... ... ... | 2 600 | 3,600 | + 1,000 |
| ,, Brazil ... ... ... | 2,200 | 3,400 | + 1,200 |
| *Static transformers* ... ... | 3,600 | 1,700 | – 1,900 |
| *Accumulators* ... ... ... | 900 | 2 000 | + 1,100 |
| *Magnetos* ... ... ... | 488 | 440 | – 48 |
| *Electricity meters* ... ... | 30 | 90 | + 60 |
| *Telegraph and telephone apparatus* ... ... ... | 60 | 77 | + 17 |
| *Radio apparatus* ... ... | 11 | 250 | + 239 |
| *Insulators, porcelain, &c.* ... | 345 | 99 | – 246 |

* Principal destinations : Peru, Argentina and Switzerland in 1923, and United States and Argentina in 1924.

# French Electrical Progress.

AN interesting report has been issued by the Union des Syndicats de l'Electricité concerning the activity of the union and the movements in the French electrical industry in 1924. The report at the outset points out that the capital which was invested in the industry last year amounted to 1,154,000,000 fr., representing new issues by already existing companies and capital raised by new undertakings. It is considered that these figures show that the confidence of the public in the electrical industry has increased. At the present time the branch concerned with the production and distribution of electricity has an invested capital amounting to 4,500,000 000 fr., employing over 25,000 men. A recent investigation has shown that there now exist in France 109 central stations of 10 000-kW capacity or over, the total being 3,000,000 kW. Other stations are estimated to have a total capacity of 500,000 kW, so that the aggregate power installed exceeds 3,500,000 kW at the present time. The consumption of electrical energy develops at the rate of about 20 per cent. per annum.

Coming to consider the manufacturing branch, the report states that the capital invested has reached 2,000,000,000 fr., as compared with 300,000,000 fr. in 1913. This industry, which found employment for 25,000 men in 1913, now gives occupation to 70,000. The productive capacity has risen from 200,000,000 fr. in 1913 to 1,500,000.000 fr. at the present time. Taking the supply and the manufacturing industries together it will be found that the aggregate capital invested now exceeds 6,500,000,000 fr.

The growing favour of French electrical products abroad is illustrated by the following figures of the exports in the past few years:—

Values in Millions of Francs.

| Year. | Exports. | Imports. | Export Surplus. |
|---|---|---|---|
| 1921 ... ... | 211 ... | 163 ... | 48 |
| 1922 ... ... | 211 ... | 118 ... | 93 |
| 1923 ... ... | 269 ... | 154 ... | 115 |
| 1924 ... ... | 413 ... | 184 ... | 229 |

The increases indicated in the table are not due to the depreciation of the franc, but to a very large extent are a result of the increase in the quantity of manufactures exported. Thus in 1921 the quantity was 6,200 tons; in 1922, 6,500 tons; in 1923, 8,400 tons; and in 1924, 11,800 tons. The export total in 1913 was only 5,050 tons, so that the exports have more than doubled since the end of the war, and this progress has been almost entirely made in the past two years.

# Russian Notes.

**The Electrical Market and Production.**—Addressing the recent third session of the congress of the Soviets, Mr. F. E. Dzjerjinsky is reported to have stated that the electrical manufacturing industry has made remarkable progress in the past six months as a result of the extension of the works of electrification and the restoration of national industry. The value of the output of the manufacturing industry for the current year (1924-25), was originally scheduled at 58,000,000 roubles, but it has already been necessary to increase the production to 71,000,000 roubles, which "considerably exceeds the pre-war level." But in the opinion of the member of the National Commissioners this extended programme will not be able to satisfy the growing demand, and in the near future it will be necessary to bring forward the question of the construction of new works. As bearing on this problem attention may be directed to a report presented on May 12th at a meeting of the electrical section of the Supreme Council of National Economy by Mr. D. P. Fridman with regard to the consumptive capacity of the Russian market. The report stated that this capacity represented a value of 34,300,000 roubles in 1922-23, 62,000,000 roubles in 1923-24, and will this year exceed 90,000,000 roubles. The report assumes that in 1929-30 the capacity of the market will have risen to not less than 329,000,000 roubles. In order to meet this demand it will be necessary to establish new manufacturing works to turn out products of the value of 170,000,000 roubles per annum, and the expenditure on these works will amount to 100,000,000 roubles. In general the manufacturing industry in the next two years will have to be strengthened to more than twice its present capacity, while 25 per cent. of the demand will have to be satisfied by means of imports.

**Orders for Czecho-Slovakia.**—It is reported from Prague that negotiations are proceeding between a Czecho-Slovakian engineering works and the largest ironworks in that country on the one hand, and Russia on the other, with regard to proposed large deliveries of steam turbines and boilers for Russian electricity works. It is stated that the Russians have asked for a credit of seven years.

**Electric Pyrometers.**—A new branch of manufacture that has hitherto not been carried on in Russia has been embarked upon by the Telephone and Telephone (Weak Current) Trust, which in conjunction with the Mining and Metallurgical Laboratory of the Scientific Department of the Supreme Council of National Economy, has brought out three types of electric pyrometers. The output in the near future will amount to from 25 to 50 pyrometers per month.

**Tramway Motors.**—The Leningrad Electric Machine Trust has received an order for the delivery of 200 motors which are intended for the suburban tramways in the region of Moscow.

**Electrolytic Copper.**—The Ural Copper Trust is reported to have produced 1,160 tons of electrolytic copper in the last quarter of 1924. This quantity was all sold, and it was also necessary to absorb some of the stocks in order to meet the demand. It is claimed that the net profits realised by the trust amounted to 137,000 roubles for the quarter.

**Financing Work in Agricultural Districts.**—The board of the Electrical Bank has referred back for further consideration a report dealing with the rendering of financial assistance for the execution of works of electrification in agricultural districts. It is held to be impossible to develop such works except by the creation of long-term loans and that under existing conditions this form of credit can only be provided by the State. It is therefore suggested that a special fund for the purpose should be created by the State and placed with the Electrical Bank, interest and redemption payments in connection with the loans being annually added to the fund.

**New Stations in the Caucasus.**—The North Caucasian Planning Committee has placed before the Electrical Planning Commission a scheme of development during the next five years. The scheme provides for the construction of four steam power stations at Stavropole, Krasnodare, Armavire and Georginevskoi respectively of a "general" capacity of 28,000 kW, and eight hydro-electric works of a "general" capacity of 64,000 kW. Besides these it is proposed to extend the existing station at the Artem mine from 6,000 to 36,000 kW, and to construct a number of transmission lines. The total expenditure is estimated at 50,155,000 roubles (about £5,055,000).

**Future Electrification Policy.**—The electrical section of the State Planning Commission has prepared a scheme for the future in connection with the revision of the original great electrification project of five years ago, which has been carried out as far as possible. The new scheme takes account of the reconstruction of industries, the agricultural industry, transport, and communal economic activity. As to the return of the funds inserted in the State budget for electrification, the commission suggests that in case the restitution is not justified, these funds must be reckoned as non-returnable advances, although it is considered that interest on them should be paid to the Treasury at a rate to be established by the Council of Labour and Defence. It is further considered that in future the budget should gradually be relieved of the burden of financing works of electrification, this being taken over by the banks with the support of State and private undertakings. It is further held to be necessary for the new electrification scheme to be harmonised with the programme of the manufacturing industry and the import of metal manufactures with the object of utilising the latest advances in foreign technical achievements and the improvement of the consuming capacity of the home market for manufactures produced in bulk.

**Large Transformers.**—Representatives of the Central Electrical Trust recently visited the site of the Volkhov station in connection with the construction of large transformers for that station. The Trust claims to be able to construct transformers of a capacity of 15,000 kW at a pressure of 110,000 V.

**A Radio Exhibition.**—An All-Russian exhibition of radio apparatus was opened in the Polytechnic Museum, Moscow, on June 1st, and it is to continue for 100 days. A foreign section is to be inaugurated on June 15th, and the Foreign Trade Commissariat, through its representatives abroad, has sent out invitations to foreign firms to participate in the section.

**Proposed Hydro-Electric Stations.**—The Grosny Oil Trust has prepared a scheme for the construction of hydro-electric stations, with a capacity of 40,000 h.p., at a cost of 1,700,000 roubles. Three stations would be built on the River Argun and two on the River Sunje.

**High-Pressure Lines.**—A scheme has been approved by the Electric Planning Commission for the supply of electrical energy from the Kashirsk station to Podolsk and Serpukov, by means of the construction of 115,000-V transmission lines. In the case of the Northern Caucasus, the Commission has under consideration a project for interconnecting the Sherbakov station, the Rudnechka station and the municipal station at Rostoff by means of a ring main, at an estimated expenditure of 7,300,000 roubles.

**The Import Trade.** — The Supreme Council of National Economy decided at the beginning of April that the electrical manufacturing trusts should enter into a convention for the purpose of consolidating the import trade in electrical manufactures, excluding large equipment. Under the original scheme prepared to give effect to this decision it was proposed not only that the convention should cover the import trade, but also that it should apply to control over regional sales, specialisation of the works, exchange of technical experience, &c., but the trusts refused to accept this form of organisation. An alternate scheme excluding the import trade from its scope has been elaborated and signed by the Central Electrical Trust, but the Electric Machine Trust and the Weak Current Trust have declined to agree to it on the ground that the import trade question has not been solved.

# Trolley 'Buses for Shanghai.

## A Test at Ipswich under Running Conditions.

An interesting test was made at Ipswich a few weeks ago by the Shanghai Electric Construction Co., Ltd., on a new type of trolley 'bus, which was part of an order for 100 such 'buses for service in Shanghai, which are now being manufactured by the Associated Equipment Co., Ltd.

The test was made by arrangement with Mr. A. P. Black, engineer and manager of the Ipswich Corporation Electricity Department, which had kindly given facilities for making the test on some of the trolley 'bus routes already installed in the town. The trolley 'bus consisted of a four-wheeled tractor driven by a 50-h.p. motor, and a four-wheeled trailer coupled together, and fitted with test bodies and an observer's cabin.

The design of the chassis is in accordance with the special requirements of the Shanghai traffic, as specified by Mr. Donald McColl, general manager of the Shanghai Electric Construction Co., Ltd., and the component parts of the chassis embody standard A.E.C. units. The overhang of the chassis in front of the fore wheels is much greater than the generally accepted idea for a road vehicle. This overhang gives the vehicle a comparatively short wheelbase, and therefore a comparatively small turning circle; the overhang space will be filled by means of an ordinary tramway life guard when the vehicle is complete and fitted with a body at Shanghai.

The tractor chassis frame consists of straight side members made from 45-50 ton nickel steel pressings 8 in. deep, 2½ in. wide, and ¼ in. thick, fitted with suitable cross members and motor supporting brackets. The approximate weight of the

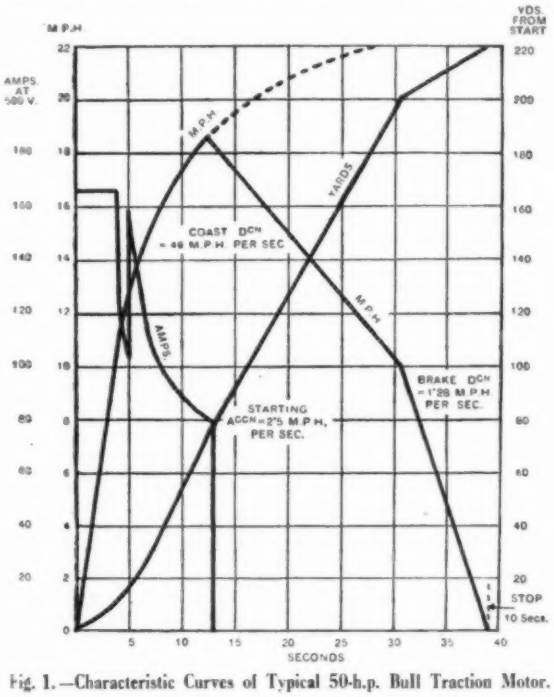



Fig. 1.—Characteristic Curves of Typical 50-h.p. Bull Traction Motor.

chassis with the motor and controller is 2 tons, 13 cwts., the frame overall length is 22 ft. 8¾ in., and the rear axle length is 5 ft. 7⅛ in. The front axle is of 45-50 ton nickel steel stamping with 3½ per cent. nickel steel swivel arms carrying road wheels made from steel castings and running on taper roller bearings.

The rear axle consists of a worm-driven transmission fitted into an axle casing made from steel castings with vanadium steel axle tubes pressed in. The road wheels run on taper roller bearings and carry 140 mm. wide twin tyres fitted to 720 mm. rims and brake drums for internal expanding brakes. The worm gear ratio is 8¼ to 1.

The steering gear is of the worm and wheel type, both worm and wheel being casehardened. The steering lever is clamped to a square ended shaft, thus providing four wearing positions. Internal expanding brakes are provided on the rear axle operated by hand lever or foot pedal independently or jointly, and a foot operated emergency transmission brake is fitted behind the motor. All the brakes are fully compensated.

A tubular shaft between the motor and rear axle is provided fitted with universal joints at each end. These joints are of the spicer type, and all wearing parts are made in casehardened steel. The joints are enclosed in dustproof and greaseright cases.

The motor has been specially developed for railless omnibus duties by Messrs. Bull Motors, Ltd., of Ipswich. The important feature of its design is that saturation is not complete at full load and thus a quick acceleration is obtained, 2.5 m.p.h. per sec. It is of the ventilated type, one hour rated for 50 h.p. at 1,000 r.p.m., and is in accordance with B.E.S.A. Specification No. 173 of 1923. The commutation is said to be sparkless at any load up to 250 amperes, with 33 per cent. field diversion. Apart from copper and insulation, steel is used for all revolving parts of the machine and also for the yoke and end brackets. Large roller bearings are fitted at both ends and a double thrust race at the commutator end. Provision is made for removing the armature complete with the bearings and their housings in place on the shaft. The shaft is of large diameter and all revolving parts are balanced before assembling, the whole armature being finally balanced when complete. Adequate ventilation is obtained through weatherproof inlets, paths being provided over the armature and through the core. All the windings are of asbestos and D.C.C.

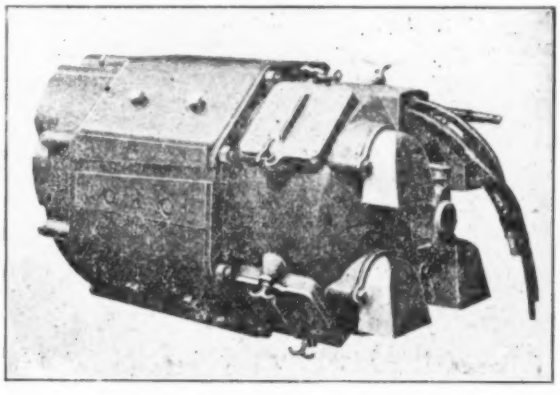


Fig. 2.—Motor Ready for Erection on Chassis.

copper. The field and interpole coils are heavily insulated with mica and web tape, and are impregnated under vacuum. Spring coil holding washers and stiff supports are provided. The armature coils are impregnated before being insulated, and thick mica troughs are taped on and leatheroid slot liners are used for mechanical protection. The whole armature is vacuum impregnated before shrouds and bands are fitted. The characteristics of the motor are shown in fig. 1. The speed curve is rather unusual, in that the torque does not drop off rapidly at the higher speeds, due to the under saturation, and good acceleration is obtained without excessive diversion. It will be noticed that the full speed is reached on the bend of the curve. Fig. 2 shows the motor ready for erection in the chassis.

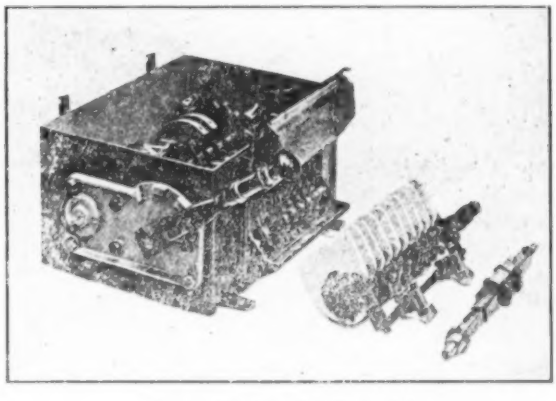


Fig. 3.—The Controller Dismantled.

The controller is of the foot-operated ratchet type, designed and manufactured by the Electro-Mechanical Brake Co., Ltd., of West Bromwich. Having regard to the conditions at Shanghai, great importance was attached to the provision of control gear of a robust character, and having the most simple arrangement of connections. The advantage of foot operation is that the driver has his hands free for steering, sounding the alarm bell, and operating the hand brake if required. In arranging a foot-operated controller it is not desirable to take an ordinary standard type controller, place it horizontally on the platform, and connect up with suitable levers so that the control barrel is revolved by pressing over a foot pedal. The controller is of the drum type and is operated

by a pawl and ratchet. The pedal is pressed forward for a definite stroke for each notch of the controller, thus the contacts on the drum are always located in their proper position under the fingers. The stroke of the foot is short but is the full movement for every notch; it does not move through a large sector of a circle for the complete movement, each notch being a part of the movement. The controller has six notches, five being plain resistance notches, and the 6th a field shunting notch giving an increase in speed due to 33⅓ per cent. of field current being shunted. To release the controller from any position the pedal is allowed to rise about 2 in. above normal; the controller is then returned practically instantaneously to the "off" position. It will be seen that this arrangement of pedal gives the "dead man's handle" feature on a foot controller. It was found during the tests that the shortest time in which the controller could be notched up to full "on" was five seconds; even acceleration is thus secured, and it is impossible with this system for a driver to abuse the motors or transmission, a result which is obtained without the complication of contactor gear. The physical effort of applying the controller notch by notch is extremely small, and in the full "on" position the foot is at rest on the platform. This arrangement is particularly suitable for native drivers in tropical or semi-tropical countries where physical exertion is an important matter.

Fig. 3 shows the controller dismantled, and illustrates the substantial character of the working parts. The controller has been tested to 400 A. at 500 V., this being approximately four times the full load capacity of the motor. At this load the controller breaks the circuit without destructive arcing or other detrimental effect. When not in use the lever at the driver's right hand is left in the neutral position, in which position if the foot pedal is depressed, there is no electrical circuit; also the hand lever cannot be moved to "forward" or "reverse" position unless the foot pedal is in the "off" position.

The resistance is of the Electro-Mechanical Brake Co.'s unbreakable jointless grid type.

Fig. 4.—The 'Bus on Test at Ipswich.

The trailer chassis is of similar design to that of the tractor without, of course the motor supporting brackets. Its approximate weight is 30 cwt. the frame overall length is 18 ft., and the rear axle length is 5 ft. 7¾ in. Internal expanding brakes are provided on the rear axle, operated from the tractor chassis by hand lever or foot pedal, independently or jointly, and a hand screw brake operating on the rear axle is fitted to the front and rear of the body.

During the tests the tractor chassis was loaded to a gross weight of 7 tons 11 cwt. 2 qrs., including six passengers. The trailer chassis was loaded to a gross weight of 5 tons 15 cwts. 2 qrs., including two passengers, making a total load of 13 tons 7 cwts. A number of acceleration and brake tests were made in Princes Street, and service tests from the station to Wherstead Road, and the station to Bourne Bridge. The first test was made with the tractor and trailer coupled together, and a series of readings were taken of the miles per hour reached in different times. The following accelerations were recorded:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 14.4 | miles | per | hour | reached | in | 10 | secs. |
| 18.2 | ,, | ,, | ,, | ,, | ,, | 15 | ,, |
| 18.2 | ,, | ,, | ,, | ,, | ,, | 20 | ,, |
| 19.1 | ,, | ,, | ,, | ,, | ,, | 25 | ,, |

Some acceleration tests were made with the tractor only, and the following results were obtained:—

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 13.8 | miles | per | hour | reached | in | 6 | secs. |
| 17.6 | ,, | ,, | ,, | ,, | ,, | 10 | ,, |
| 19.5 | ,, | ,, | ,, | ,, | ,, | 15 | ,, |
| 20.2 | ,, | ,, | ,, | ,, | ,, | 20 | ,, |

Service tests were made with the tractor and trailer coupled together, and the following results were obtained:—Station to Wherstead Road, 0.87 mile in 6 minutes; overall speed 8.7 m.p.h., including 5 stops of 10 seconds each; the running time was 5 min. 10 sec., the average speed running time 10.01 m.p.h. and the average pressure was about 450 V. Station to Bourne Bridge, 1.56 miles, in 9¼ minutes; overall speed, 9.85 m.p.h., including 9 stops of 10 seconds each; the running time was 8 minutes, and the average speed (running time) 11.7 m.p.h. The route was mainly level, but with two sharp curves and two short gradients, and was of dry macadam road. The energy consumed on the Station to Bourne Bridge test was 4.10 kWh, or 2.63 kWh per mile. The average pressure was about 450 V.

Fig. 4 shows the vehicle on test at Ipswich.

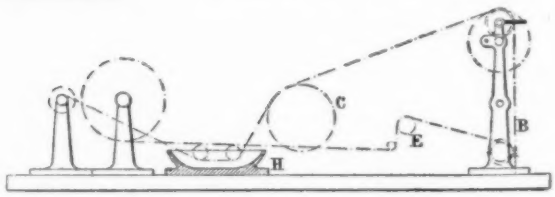
An interesting feature of this vehicle is its passenger carrying capacity, namely, 3 tons and 3½ tons respectively on tractor and trailer. In Shanghai the authorities reckon 20 passengers to the ton, so that a tractor and trailer would be able to deal with a maximum load of 150 passengers.

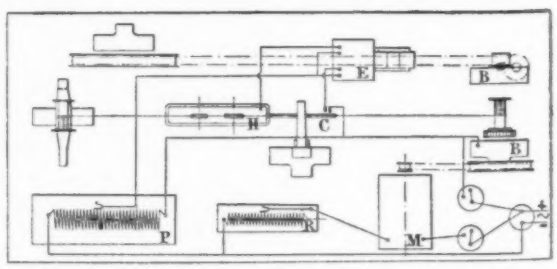
At a subsequent demonstration of one of these 'bus chassis, tractor and trailer, at the A.E.C. works, we were able to witness its quick acceleration and steady running. It ran in a circle of probably 20 ft. radius at about 15 m.p.h. The running was extremely smooth and the noise was negligible.

# The Insulation of Enamelled Wire.

### The Cathala Recording Apparatus.

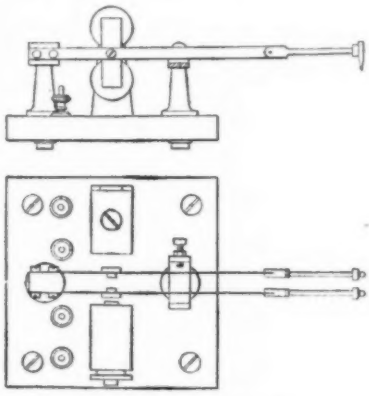
In recent years there has been a considerable extension of the use of wire covered with enamel, or insulating varnish, for various electrical purposes. Experience shows, however, that enamelled wire frequently possesses a number of microscopical defects where there is either faulty, or an entire absence of, insulation. To determine such imperfections, tests are frequently made in a mercury bath; the wire, the core of which is connected to one of the poles of any available source of electric current, is passed through a mercury bath which is connected to the other pole of the electrical circuit in which an indicator is introduced. The length of the bath, the speed at which the wire is passed through it, and the number of admissible imperfections, are among the items of the tests which users of enamelled wire often specify. Usually, as simultaneous current indicators, an electric lamp and totalising meter are used. In M. Cathala's opinion, however, this form of indicator is unsatisfactory in that it furnishes somewhat illusory information. While it provides information as to the reciprocal position of the imperfections in the length of the wire, the intervals between the successive flashes of the lamp only afford an imperfect idea of the distance between two imperfections, owing to the speed (20 metres per second) at which the test is carried out. Moreover, when imperfections occur at several points in the length of wire actually in the bath at any particular moment, the meter only operates once, the only indication then afforded being the duration of the flashing of the lamp.




Figs. 1 and 2.—The Cathala Enamelled-Wire Testing Apparatus.

With the view of providing a more reliable means of testing, M. J. Cathala, who recently described his apparatus at a meeting of the French Académie des Sciences in Paris has devised a graphical registering arrangement, details of which are shown in figs. 1 and 2, which are reproduced from the *Génie Civil*. It will be seen that the apparatus comprises a mechanical device A, belt driven by a 1/10-h.p. electric motor M, the speed of the latter being variable by means of the rheostat R. The device A draws the wire under test and a registering band of paper simultaneously, but at different speeds, the relation being 10 metres of wire to approximately 25 mm. of the recording paper strip. The wire to be tested in the mercury bath H passes



Figs. 3 and 4.—The Recorder.

once completely round the wheel C—which is rotated without slip—and returns to the bobbin B. An earth connection on the latter connects the core of the wire to one of the poles of the electrical circuit, while the mercury bath is connected to the other pole across one of the electromagnets of the recording device E. The wheel C, the circumference of which measures exactly 50 centimetres, releases every 20 revolutions a contact which closes the circuit of the other electromagnet of the recorder E, a record being thus obtained for each 10 metres of wire.

Details of the registering device and its connections are shown in figs. 3 and 4. One of the records obtained is reproduced in fig. 5, from which it will be seen that it is not only

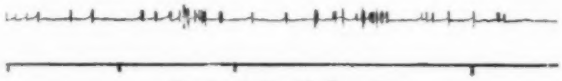


Fig. 5.—A Graphic Record.

a simple matter to count the number of imperfections, but also to see where they exist, from which much information useful in the manufacture and utilisation of enamelled wire can be drawn. The accuracy of the system has been demonstrated by passing the same length of wire twice through the apparatus, which gave records so identical that they could be accurately superimposed. M. Cathala also claims that by using several successive baths of mercury and interposing between each pair suitable mechanical arrangements, it is possible to obtain a good idea of the mechanical quality of the insulating enamel.

# New Electrical Devices, Fittings, and Plant.

***Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.***

### Open-coil Boiling Plate.

The accompanying illustration, fig. 1, is of a new design of open-coil boiling plate recently marketed by CARRON COMPANY,

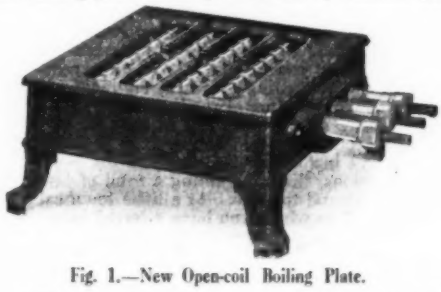


Fig. 1.—New Open-coil Boiling Plate.

Carron, Falkirk. The coils are arranged in a casing of sheet steel mounted on a base with four feet. The terminal box and the top are of cast iron. The heating element, which is mounted on special refractory formers, is designed for pressure at 200 V. The dimensions of the plate are 8 by 6⅜ by 4 in., and it weighs 7½ lb. The plate is supplied complete with a porcelain metal-sheathed connector. The loading of the plate is ¾ kW. A similar design for rapid boiling is also a product of Carron Company, the loading in this case being 1½ kW.

### A New Xcel Connector.

A new and improved connector for use with "Xcel" domestic electric appliances has recently been produced by the AUTOMATIC TELEPHONE MANUFACTURING COMPANY, Milton Road, Liverpool, and is illustrated in fig. 2. It is of the metal-sheathed or armoured type, the top internal porcelain insulator and finger-grip being moulded in one piece, thus ensuring maximum strength and freedom from breakage at this vital point. The spiral spring support is of novel design; it is securely hook-anchored to the porcelain, and is rigid at this point by virtue of several heavy turns immediately adjacent to the body of the connector thus preventing bending and consequent strain on the flexible at its weakest point. The free end of the spiral spring support on the other hand is bell-

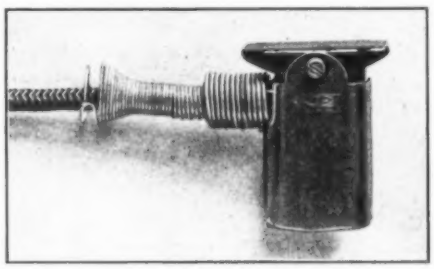


Fig. 2.—Improved Connector.

mouthed and sufficiently flexible to allow free movement of the cord without friction between the latter and the spiral.

Provision is made for earthing the metal sheath of the connector to the shroud surrounding the terminals on the "Xcel" appliance with which it may be used. Good contact is ensured by the insertion of a flat spring in the two slots provided in the metal sheath of the connector. The makers are also adopting a new high grade of flexible cord with special insulation embodying strands of tinned steel wire in the conductors which are laid up in circular formation with an outside overall braiding.

### Portable Electric Air Compressor.

The accompany illustration, fig. 3, is of a portable electric air compressor, which is marketed by the ELECTRO DYNAMIC CONSTRUCTION CO., Malt Street, London, S.E.1. It presents a light and compact design of combination motor and compressor, suitable for garages, &c., requiring a small supply of cool compressed air. It is of robust construction, has a minimum of working parts, weighs 60 lb., and its overall dimensions are 14 in. by 14 in. by 11 in.

The compressor is of the 2-cylinder type, running at 600

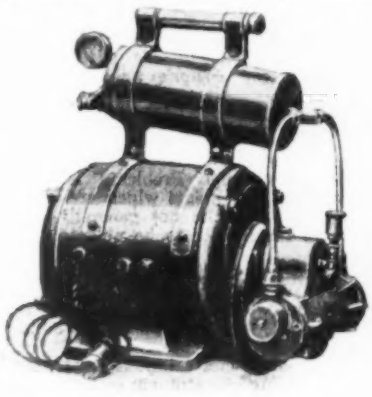


Fig. 3.—Portable Electric Air Compressor.

r.p.m., and is geared to the motor through a 3 to 1 gear. It is totally enclosed in an oil-proof case which is integral with the cylinder and forms the end bracket of the combination.

The motor is suitable for a.c. or d.c. supply, and the combination is made in two sizes to give (1) 900 in. displacement, and (2) 1,800 in. displacement, at pressures up to 125 lb. per sq. in.

### Winding Machine for Heavy Coils.

A recent production of the MIDLAND DYNAMO & MOTOR REPAIRS CO., LTD., Leicester, is the winding machine for heavy field and transformer coils, illustrated in fig. 4.

The main feature of this machine is the clutch. It is of the expanding type, and is operated by wedges which can be readily adjusted when worn, and replaced after long service. The clutch is operated by foot and is designed to stop imme-

diately pressure is withdrawn. It is claimed that it cannot stick and will not grip too fiercely, and that with the slightest pressure the spindle can be made to move irrespective of the load. The coil winder is worm driven, and the worm, which is of steel, runs in an oil bath. It is stated that the machine is powerful enough to wind the heaviest metal strip used, and will wind ordinary copper wire rapidly and efficiently.

The steel spindle carries a worm and is mounted in heavy

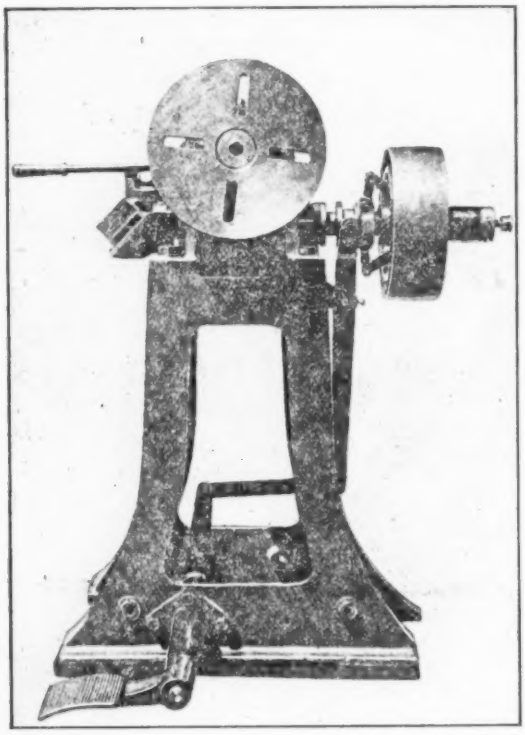


Fig. 4.—The "Midland Dynamo" Coil Winding Machine.

gunmetal bearings. A dog clutch on the main spindle shaft operated by a hand lever enables the main spindle to be reversed at will. The machine can, therefore, run backward or forward either quickly or slowly as required.

# Correspondence.

***Correspondents** should forward their communications* **at the earliest possible moment.** *No letter can be published* **unless** *we have the writer's name and address in our* **possession.**

### The Electricity Supply Problem.

Your leader in last week's issue of the ELECTRICAL REVIEW on "The Electricity Supply Problem," is exceedingly opportune in view of the statements which are being made at frequent intervals to a public not generally sufficiently well acquainted with the matter to be able to form considered opinions.

It is being said that infinitely too much is paid for electric light and power, that a big discrepancy exists between figures possible to-day and what would be possible if the nation were adequately equipped, that we consume less units per head than other countries, and so on.

Apparently three distinct solutions exist for rectifying this state of affairs, having one common feature, *viz.*, that the cost incurred by each separate proposal will be borne by the public, who will share the benefits or losses. The cost is certain; the result is pure speculation.

So far as our great industrial centres are concerned, there is very little to hope for in the direction of cheaper supplies with our present knowledge, as you so well show in your article. Competition between the large producing authorities already enforces the utilisation of every means of obtaining economies as and when these become established, and to extend the results of economical generation beyond an economical distribution area cannot advantageously affect prices.

High-voltage transmission is being employed already where circumstances demand it, and to make it a paying proposition it is essential that large amounts of power at good load factors and power factors shall be dealt with.

These conditions are not necessarily fulfilled by the haphazard extensions to rural areas so hopefully referred to by enthusiasts, and it is quite possible that where such a demand exists which would justify the cost of expensive transmission, local conditions themselves provide excellent facilities for generating the energy on the spot.

Whilst a more abundant supply may be furnished by a Government scheme backed by the finances of the whole country, it will not necessarily be cheaper than that which is and which will be furnished by existing competent authorities keenly interested in their local finance who are usually willing to extend their supply to neighbouring localities.

Undertakings have been handicapped in the past by the fostered cry of "dear electricity," and now that experience is teaching the general public that electricity is not dear, it is unfortunate that eminent men of all political parties should have felt it necessary to use this expression as an argument for political action.

Electricity is not dear, it is cheap. It can and will be made cheaper, but it cannot have the tremendous effect upon our industries which some contemplate. With one or two exceptions it is not too much to say that a free supply of electric power to our large industrial concerns would have a very small effect indeed on the cost of production.

By far the best way to reduce prices is to develop the uses and applications of electricity. In this way capital already expended will become more remunerative, apparatus cheaper, and general conditions of existence improved.

The public must be taught that electricity is cheap; that it is to their comfort and advantage to use it, and that it will be provided abundantly and cheaply where it is required. The demand will then arise, large and economical stations will be constructed, and the necessary mains laid, without any artificial culture or enforced growth.

**C. Nelson Hefford,**
*Manager.*

Electricity Department, Leeds, *June 8th*, 1925.

### Trade with Brazil.

I have followed with very great interest, as do many Brazilian engineers, I have no doubt, the frequent notes you publish relating to their country. It is only the utterly erroneous ramblings of Mr. J. E. Stewart, as printed in your issue of June 5th, that decided me to write these lines.

I will deal, first of all, with your splendid reference to "Trade with Brazil,' in your issue of May 22nd, in which it is reported "' that several hundred thousand pounds in value of contracts were lost to the United Kingdom." I should like to quote a letter which I have received, not from the great industrial city of Sao Paulo, but from away up in Diamantina, State of Minas Geraes, this quotation being, in my opinion, of considerable value as proving that what the chairman of the British Chamber of Commerce of Sao Paulo said was indeed true, and not merely eye-wash, so to speak:—

"They are having a devil of a time of it in Sao Paulo, due to lack of power, as they have had no rains of any account since last June. The power plants have only been able to supply less than 50 per cent. of their usual output, so factories have been closing down and 120,000 people thrown out of employment. On the other hand the Light and Power are employing 20,000 men getting power to Sao Paulo from Santos and the surrounding towns. *Agents from Sao Paulo are going all over the country trying to buy old boilers and gas engines, for which they are paying fantastic prices.*"

I think you will agree that it should be quite obvious to the British manufacturers after reading the above lines, that the remarks of the chairman of the British Chamber of Commerce at Sao Paulo, as published in the *Journal* of the Chamber, and as quoted by your good selves, are really worthy of considered attention for their own future benefit.

As a further proof that there is something radically wrong somewhere, may I refer you to the "Tramway and Railway Notes" column of your issue of April 24th, by which it will be seen that some Brazilian capitalists proposed to form a company to construct an electric railway from Sao Joao de Nepomuceno to Lauras. They are evidently tired of waiting for the foreigner, but the fact that they themselves are going to carry out the work, merely serves to prove that the foreigner will be the loser; for as far as I can remember there are some four or five towns to link up, the proposal being for the transportation of raw coffee, as well as lighting and power. I should like to tell British merchants and manufacturers, briefly, a little of the history of the existing power station and the linking up of three villages not including Lauras.

During 1901-1910 I was responsible for what was considered, in those days, the design and construction of a model hydro-electric installation; consequently, I managed to get into the good grace of the "powers that were," and eventually became assistant to the consulting electrical engineer of the State, a very clever English-trained Brazilian engineer. As his assistant, I naturally did all the work (chiefs please note), but in doing so I travelled over the greater part of the State, visiting all the existing installations, as well as the localities for proposed installations, thereby gaining a fund of knowledge as to requirements second to none. At a little town called Sao Joao de Nepomuceno, to which you have referred in your "Railway Notes," I became friendly with some coffee farmers, and one of them gave me—(British manufacturers and merchants, please do not weep; take courage; Brazil is a big country, and your turn may easily yet come to get something for nothing)—a whole waterfall, for a whole term of 50 years, provided I erected a power station and linked up three villages by means of an electric railway (not including Lauras).

I should here like to mention that the cost of transporting coffee would have entirely paid for the installation in the first year after which there were 49 to sit down and draw in the "bawbees," just as is being done at the present day in a few British concerns. That was in 1913. Well, I offered that concession to various managers of British concerns in Sao Paulo, but not one could touch it; they would not be backed up by their principals in England; so I had to very regretfully return the gift of the "whole waterfall."

Messrs. Siemens-Schuckert, however, then got a look in, and so, whilst I was doing my bit in France, Siemens brought machinery from the States and put in the installation, and good luck to them. Siemens had already a good reputation in that State and it goes without my saying it, that in the future they will always do good business there.

I read in *The Times*, during the month of May, that an electrical engineering company was grumbling about trade depression and foreign competition. Why? I wonder what the particular firm would say if I told them that they had supplied the alternators for an installation in a certain State of Brazil; that the said alternators were behaving just as a British machine should behave; but that since making their first supply they had done nothing more; that the self-same firm had supplied one of the first electric motors to Rio de Janeiro, and that it was still going strong in 1923. What would the British manufacturer say of his printing machine, standing in the midst of those of Italian and German make, and doing all the work? It must be nearly 37 years of age now.

But enough! It is plainly evident that the British manufacturer of to-day is akin to his workman; in other words, 99 per cent. profit plus two-thirds of the remainder (?)

And now to deal with the erroneous ramblings in the letter of Mr. J. E. Stewart in your issue of June 5th. In my opinion, the information, instead of helping the smaller British manufacturer and the would-be financier (we have already interested in Brazil quite a number of very useful financiers, thank you), only serves to discourage them.

When Mr. Stewart talks about the Southern States becoming a German Colony, I feel tempted to ask him whether he has forgotten all about the "Monroe Doctrine." I wonder what the United States would have to say about it, not to mention the Brazilians. He will also be glad to know that railway communication was established with the Southern States long before the war. True, a "Flying Scotsman" is not in being, but surely Mr. Stewart will admit that his ancestors not so very long ago ran about this little island painted blue and green. He says the foreign element in Santos and Sao Paulo is mainly British, but used to be French. Oh, Mr. Stewart, or is it Rip Van Winkle, you surely know that the Italians made Sao Paulo!

As for Rio de Janeiro, I would again beg to differ, the principal foreign influence (not £ s. d.) is Portuguese. French ladies may predominate, but I rather think, especially since 1914, that English and Americans come after Portuguese.

I do not know how much of your valuable space will be taken up, but I consider the childish statements as made by Mr. Stewart only serve to discourage the manufacturer from trying his luck in Brazil, especially when he makes such a 'cute remark as "if some large group of London financiers," &c., &c.

Now, I really wonder what the Earl of Bessborough, Lord Lovat, and the many other lords who put their every penny piece into the country, would think? Then he concludes by saying "But then, of course, they would be encroaching on the Pearson group's sphere of influence." How remarkable! Why not get a dictionary and look up the meaning of the word "concession."

There is now no doubt that that well known and equally well-informed gentleman, Dr. Paul Regis de Oliveira, the newly-appointed Brazilian Ambassador, spoke the truth when at the dinner on June 4th of the Latin American Society of Great Britain, he said, "Many English people still had vague fantastical ideas about Brazil, drawing an image more picturesque than constructive. Brazil was not filled entirely with forest trees and coconuts."

Let me tell British manufacturers and merchants, that if they have goods to sell that are worth buying, they can go to Brazil with a lighter heart than that which takes them to the Colonies or India, or anywhere else, for business is surely to be had. As proof, I refer to the speech of the chairman of the British Chamber of Commerce of Sao Paulo, backed up by my letter from away "Back o' Beyond," plus my statements in these few lines, subscribed as they are by the only English engineer to have had the honour of serving the Brazilian State Government of Minas Geraes in the capacity of a consulting engineer for hydro-electric installations.

*June 6th*, 1925. **F. T. C. E.**

---

### Fires Caused by the Charging of Accumulators.

With reference to "Surveyor's" letter of May 11th, we would point out that there is no danger of fire occurring when accumulators fitted in celluloid containers are charged, provided the charging arrangements are properly supervised by a competent electrician.

"Surveyor" is evidently not aware that accumulators of non-inflammable types are available. We have for many years manufactured portable batteries fitted in ebonite, and alternatively, glass, containers. These are eminently suitable for wireless work, and although the public demand is usually for accumulators in celluloid containers, there is also a steady and increasing demand for the non-inflammable types fitted in glass and ebonite containers. If "Surveyor" would like to have any further particulars regarding these types of "Hart" batteries, we shall be pleased to forward full information to him if he will communicate with us.

**Hart Accumulator Co., Ltd.**

London, *June 2nd*, 1925.

[Some valuable information on this subject appears elsewhere in this issue.—EDS. ELEC. REV.]

---

### Technical Journals for Boys.

Your correspondent "E. C. B." on "Technical Journals for Boys," in the issue of June 5th, has greatly interested me, as I am very keen in all boys' welfare. For some time I have been trying to start a club for young engineers, but I find great difficulty in getting support, especially in the case of finance.

I give a brief outline of the idea as follows:—

Suitable club-room(s) open three or four nights a week, and during the day.

A library of suitable technical books, journals, &c.

Games.

At least one lecture a week on some subject of engineering interest.

The club to be kept up by a small subscription.

I find a similar club is in existence, but the entrance fee and subscription are beyond the means of a lot of the younger boys. I feel very deeply for the welfare of young engineers and am always ready and willing to assist them. I should be pleased if any of your readers would be so kind as to support me.

*June 7th*, 1925. **Junior.**

---

### The Engineering Profession and Industry in Ireland.

For some time past I have been in communication with both Governments in Ireland with a view to enlisting their sympathy and support in any movement having for its object the improvement of the status of qualified engineers. The Institutions prefer to stand on one side, merely exercising their functions as learned and examining bodies.

The wretched conditions existing in this country are not so well known to British engineers. It is possible that they may think they are not affected in the least. If they do, I fear that they are making a mistake which will have serious consequences.

The consulting branch is mainly in the hands of unqualified men to whom the ethical observances of professional conduct are unknown. These men openly solicit, circularise, and tout personally, and bring all the machinery of political pressure into operation in the exercise of their business. This type of consultant is mainly recruited from the ranks of unqualified architects, sanitary men, and ironmongers' electricians. By the use of bowdlerised and bogus distinction letters they hold themselves out as duly and properly qualified men. The favourite distinction chosen is C.E., implying, of course, a chartered or civil engineer, or both. It is admitted that any person may call himself any kind of engineer he chooses, but he may not use distinction letters signifying qualification and registration under a chartered or university authority. But though he may not do these things he does them and continues to do them, and will do them until proper legislation to prevent it is carried into effect through an Engineering Council. At present no such council exists.

It is an unfortunate fact that in the face of the very peculiar practices—practices which would astound many of our staid and dignified practitioners in Great Britain, if I claimed space here to set them out in full—of these men the mere handful of really able and competent engineers in this country cannot hope to exercise their profession.

Both Governments in Ireland are aware of their activities, but as the functions of the former extend only to questions of the qualifications requisite or necessary for certain engineering appointments made by local authorities acting under Statutory Orders, and so coming within the purview of the responsible Ministry, they cannot interfere. With regard to electricity undertakings less than five per cent. are worked under Statutory Orders. In the case of the Free State some steps were recently taken by the Ministry of Industry and Commerce to bring all electricity undertakings within its purview and to carry into effect such legislation as would make it impossible for one penny of public money to be paid out unless under the certification of a qualified man, but it found itself beating the air, because there was no recognised organisation prepared to work with it. One of the Institutions was of opinion that the Government should approach it before it could take any steps in the matter. As a result nothing was done. When a Government allows a movement of this kind to pass, it is very difficult to get it to revive its interest afterwards. This really was a magnificent gesture on the part of the Free State Ministry to help the qualified men. Notwithstanding the direct snub it received, the Free State Government is prepared to help. The Northern Government suggests the formation of some such Council as that at the back of the medical profession. It is well known that the Medical Council is a particularly alert body, and very little can get past it.

The small body of professional men acting as consultants in this country are earning a very precarious living—where they are able to earn a living at all. Many of them have no practice whatsoever. A few are going over to the industrial and commercial side, and some are trying technical journalism. Ex-

cept in practised hands there is very little sustenance " to be sucked from a quill," as Elia has it. The rest will inevitably come on the dole, and the way is clear for the enterprising adventurers whom the hour and the opportunity have called forth.

In a short time the Water Power Development Schemes will have passed the Senate of the Free State. There will be many engineering appointments open for electrical men when the initial civil engineering work has advanced to a certain stage. Already hundreds of applications have been sent in. The number and variety of the men on the lists are amazing. Garage men who have made a joint which worked all right on the wiring of a car, gas fitters and ironmongers who have put in bells, electricians of the clothes-line and prop order, builders' men who know all about " flures " (floors), wireless fans who know all about every blessed thing, all these and a thousand more nondescripts, are prepared " to do the State some service." Unless something is done these will be the State expert electrical engineers of the near future. There is no live and skilled organisation in existence to prevent it.

But it is not the few men of the consulting type who will suffer. It is the careless British manufacturer. He it is, who will get hit most severely and effectively, and he most thoroughly deserves it. Ireland and Irish business are to him a huge joke. His contribution to the merriment of this country of keen wits is characteristic. His representative here is usually an ironmonger or an agricultural implement agent who looks on his English agency for electrical manufactures as a side line. He doesn't even think it worth his while to try to understand anything at all about it; it is quite enough to gabble from the catalogues supplied to him by the English house which he thinks he is efficiently representing. This type of manufacturers' agent has already done a great deal of injury to his principals, but when he takes his stand against his foreign highly-trained and specialist competitor, the result is a foregone conclusion: German firms are entrenching themselves in Dublin. From what I have seen of them it will take the best men in the British service to deal with them. A good price and a good article will not do. Something more must be put into it, unless the manufacturer is afraid that it will be bought. The Irish firmly believe that English manufactures are good. I have met all kinds of men here, and even in heated argument I have never yet heard anyone say a single word of disparagement against English goods. Unquestionably the goods are good, but it is not enough. It may even be that they are much better than the competing articles, but they will not be sold. The consultants in their efforts to do their best for their clients are doing more for the British manufacturer to-day than his nondescript agent will ever be able to do, and the consultants are not being thanked for it.

The methods of the British manufacturer in this country are cheap and nasty. How often does he appoint a technically trained man? What on earth is the use of a qualified man? He hasn't got a good show on a good street. It costs something to keep up a good show on a good street in an Irish city. Why should he pay for this when he can get it all for nothing, and an agent " on results " into the bargain? It may be quite true that in the majority of cases the agent secures the job for the simple reason that he cannot miss it. The name and reputation of the firm and the price win. The agent cannot help it. He gets his commission—that technically trained man would hold out for a salary. Again, there is the item of an office and its upkeep to be considered!

There are other things to be considered. Ireland is not a poor country, even though shipbuilding and the linen trade of the North are down and out for the moment. The people of this country are not a bit like their caricatures on the British stage. They are, possibly, the keenest business men in the world. Hitherto, there has only been one market open to them for engineering manufactures. That day has passed. Hitherto, there has not been any unusual activity in the Irish market for engineering goods. That day has also passed. With the five millions State expenditure on the Shannon scheme alone, and that an initial expenditure, there will be at least twenty millions expended by local authorities and consumers on plant and material. European firms are already here; American firms will be here in a short time. Already foreign workshops and immense steel works are being laid out. Can the manufacturers' amateur agent cope with the men who will handle these? Is the more or less shadowy representation in side line on an expensive street the correct thing? Or are trained men of any use? The open market and the open bargain are dead. The State will exercise control. The State engineer must be a qualified man, exercising all the privileges and responsibilities of a qualified man in any other profession. In his hands, the British manufacturer has nothing to fear in any contract system the State may devise. But in the hands of any but qualified men he must realise that danger lies, and the danger lies in the fact that he will be left out, or brought in and played with, and even the State cannot help him.

A meeting will be held in Dublin at an early date. It is open to all qualified men, whether they are engaged on the professional or the commercial side. British manufacturers having qualified men in charge of their interests in this country would help by requesting them to attend and assist in the work of forming a Council. This Council, which would follow on much the same lines as the Medical Council, would prepare a register and proceed to carry into effect, in co-operation with the State, legislation to safeguard the interests of all qualified men.

The B.E.A.M.A., the British Engineers' Association, and the Federation of British Industries, would assist immensely by having their representatives present. It would be esteemed as an act of great courtesy if the three great Institutions arranged to be represented at this meeting. They would also assist by sending their registers to the writer for the use of the Council. The Minister of the Free State Industry and Commerce Section and the Minister of Home Affairs of the Northern Government will be invited to attend, and may possibly make statements as to the action of their respective Governments in association with the proposed Council.

Newry, Co. Down, *June 4th*, 1925. **P. T. White.**

# Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

## 1923.

28,493. " Manufacture of filaments for electric lamps, thermionic tubes, and the like." W. R. Bullimore. November 12th, 1923. (233,487.)

28,522. " Radio warning systems for use on vehicles." H. Flurscheim. December 5th, 1923. (208,126.)

28,762. " Electrical valve amplifiers." W. H. Priess. November 14th, 1923. (233,737.)

31,399. " Apparatus for recording automatically Morse or the like telegraph signals in type printed characters." R. E. M. Penot. December 14th, 1922. (208,554.)

## 1924.

726. " Illuminated signs." C. E. McLeod. January 10th, 1924. (233,744.)

873. " Electric sorting-machines for perforated cards." F. R. Bull. January 13th, 1923. (209,760.)

1,128. " Telegraphic transmission of pictures and images." E. E. F. D'Albe. January 15th, 1924. (233,746.)

1,153. " Electrical operation and control of metal-cutting and like machine tools." J. C. Shaw. January 15th, 1924. (233,747.)

1,304. " Tuning devices for radio-receiving sets." P. W. Willans and A. Stanley. January 16th, 1924. (233,750.)

1,319. " Electric flashing devices." R. E. Ollerenshaw. January 16th, 1924. (Cognate application 5,752/24 and 12 031/24.) (233,751.)

1,339. " Electric fuses." V. Hope. January 17th, 1924. (233,752.)

2,998. " Electric switch or cut-out mechanism." M. Zalum and A. Corcos. February 5th, 1924. (233,757.)

3,485. " Microphones." T. W. Case. February 11th, 1924. (Addition to 227,173.) (233,763.)

3,573. " Electrothermic devices for controlling purposes." T. Kalle. February 11th, 1924. (Convention date not granted.) (212,881.)

3,640. " Means for energising an electric winding, relay, or the like, after a definite time lag." British Thomson-Houston Co., Ltd., and A. S. Fitzgerald. February 12th, 1924. (Patent of addition not granted.) (233,767.)

3,863. " Automatic electric circuit-breaking devices." K. Nobuhara. February 14th, 1924. (233,777.)

3,875. " Loud-speaking telephonic receivers." E. A. Graham. February 14th, 1924. (233,779.)

3,890. " Crystal detectors." British Thomson-Houston Co., Ltd., and W. F. Boyd. February 14th, 1924. (233,782.)

3,893. " Electric spark-gap apparatus, switches, connectors, and the like." D. E. Barnett. February 14th, 1924. (233 783.)

3,998. " Ignition magnetos for internal-combustion engines." British Lighting & Ignition Co., Ltd., J. C. Hutton, and H. E. Whitehouse. February 15th, 1924. (233,791.)

4,001. " Semi-automatic telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. February 15th, 1924. (233,792.)

4,002. " Automatic or semi-automatic telephone systems." Automatic Telephone Manufacturing Co., Ltd., and C. Gillings. February 15th, 1924. (233,793.)

4,131. " Electric distribution boards or boxes." B. Bell. February 18th, 1924. (233 798.)

4,160. " Inductance-coil carriers." Igranic Electric Co., Ltd., and A. H. Curtis. February 18th, 1924. (233,801.)

4,259. " Means for preventing interference in wireless and like receiving apparatus." D. H. McDonald. February 19th, 1924. (233,802.)

4,564. " Electric measuring instruments." Crompton & Co., Ltd., W. F. Jones, and W. G. Smith. February 22nd, 1924. (Cognate application 27,892/24.) (233,808.)

4,837. " Thermo-electric batteries." Fuller's United Electric Works, Ltd., and A. P. Welch. February 26th, 1924. (233 810.)

5,342. " Electric fuse blocks." N. E. North, W. T. Gray, F. B. Holt, and Metropolitan-Vickers Electrical Co., Ltd. March 1st, 1924. (233,818.)

5,626. " Device for electrically connecting a plurality of leads to a terminal." F. E. Wilson. March 5th, 1924. (233,820.)

6,732. " Control of electric motors." Electro-Mechanical Brake Co., Ltd., and M. J. Pattison. March 15th, 1924. (233,827.)

7,970. " Devices for closing winding-slots in dynamo-electric machinery." British Thomson-Houston Co., Ltd., and F. P. Whitaker. March 28th 1924. (233,838.)

8,086. " Aerial earthing means for use in connection with apparatus for wireless telephony, telegraphy, or the like." Busby & Co., Ltd., and H. D. Twine. March 31st, 1924. (233,841.)

8,612. " Ear suspended wireless headphone." G. C. Mutlow. April 5th, 1924. (233,847.)

9,782. " Automatic telephone systems." Siemens Bros. & Co., Ltd., and W. G. Patterson. April 17th, 1924. (233,859.)

9,828. " Telephone mouthpieces." Sterling Telephone & Electric Co., Ltd., and F. G. Bell. April 17th, 1924. (233,861.)

10,263. " Shade-holder for electric incandescent lamps." A. W. Ryland. April 25th, 1924. (233,866.)

11,518. " Alternating-current electricity meters." G. Wall and Metropolitan-Vickers Electrical Co., Ltd. May 9th, 1924. (233,877.)

11,595. " Insulated leading-in devices for electrical purposes." T. Sloper. May 10th, 1924. (233,880.)

## 1925.

1 392. " Electromagnetically-operated variable-speed gear." Magnet-Werk Ges. Eisenach. March 13th, 1924. (230,797.)

1,692. " Rheostats." J. C. Snell. January 20th, 1925. (234,017.)

1,859. " Acoustic signalling devices." Soc. Anon. pour l'Equipement Electrique des Véhicules. February 28th, 1924. (Addition to 209,395.) (230,024.)

1,884. " Apparatus for translating pressure variations into electrical variations." Westinghouse Electric & Manufacturing Co. January 25th, 1924. (Addition to 207,182.) (228,169.)

2,039. " Switch devices for electrically-operated accessories on motor road vehicles and the like." Daimler-Motoren-Ges. January 23rd, 1924. (228,179.)

3,977. " Electrical valve amplifiers." W. H. Priess. November 14th, 1923. (Divided application on 233,737.) (234,023.)

3,978. " Electrical valve amplifiers." W. H. Priess. November 14th, 1923. (Divided application on 233,737.) (234,024.)

3,979. " Electrical valve amplifiers." W. H. Priess. November 14th, 1923. (Divided application on 233,737.) (234,025.)

5,658. " Telephone systems." Automatic Telephone Manufacturing Co., Ltd. August 25th, 1923. (Divided application on 6,423/24.) (230,104.)